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THE ANATOMICAL AND PHYSIOLOGICAL BASIS OF PHYSICAL TRAINING*

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In view of the recent interest shown by the State in problems of physical education it may be profitable to consider certain anatomical and physiological facts which so far have not been given the prominence and forethought they demand. I propose to consider certain anatomical features and growth changes in the spine, the upper limb girdle, and the lower limb girdle, together with certain physiological principles in relation to posture. Agility, strength, and dexterity are useful servants but dangerous masters. Any collection of skeletons in a museum shows a high percentage of aged females and a higher percentage of adventurous inquisitive young males.

The Spine

As Ward (1876) said: "The vertebral column is a remarkable piece of mechanism. Strong enough to support several hundredweight, yet pliant and elastic: furnished with levers and muscles, by which it is bent in every direction, yet lodging an organ susceptible to injury from the slightest pressure: formed, for lightness, of a loose and reticular tissue, yet capable of sustaining, without fracture, shocks, strains, and contortions of considerable violence: this column certainly combines the most opposite qualities, and performs functions apparently incompatible."

In the infant each vertebra consists of three bony parts, a centrum and two lateral masses, separated by the neurocentral articulation, which consists of a plate of cartilage faced on both sides by a thin layer of calcified cartilage (Harris, 1933). The presence of three tissues so different in physical properties as bone, cartilage, and the intervening calcified cartilage is in itself a source of mechanical weakness in each vertebra. Active growth in size of the vertebra takes place at the neurocentral articulation (Fig. 1). The cartilage plates grow in thickness, cartilage is calcified and replaced by bone: the three constituent parts of the vertebra are carried further apart. The cartilage plates are true epiphysial plates, and are therefore subject to all those injuries and diseases which take place in the fast-growing epiphysial plates of the long bones. Bony union of the centrum and lateral masses to form the definitive vertebra by calcification and ossification of the neurocentral articulation is completed by 6 years of age.

In later childhood the spine consists of individual bony vertebrae, covered above and below by cartilage plates, and separated from one another by intervening fibro-

FIG. 1.—Radiograph of typical thoracic and lumbar vertebrae in the lamb to show the cartilaginous neurocentral articulation between the centrum and the right and left lateral masses. The spinal canal is larger than in the adult sheep.

cartilages. At puberty certain changes take place. Annular epiphyses of bone appear in the cartilage plates above and below each vertebra, so that the vertebra now consists of bone, epiphysial bone, epiphysial cartilage, and calcified cartilage (Figs. 2 and 3). This increase in the heterogeneity of the tissue elements in the spine accounts for its special susceptibility to deformity and disease in puberty and adolescence. Kyphosis, lordosis, and, in particular, scoliosis appear. The vertebra with its superior and inferior epiphysial bony annuli is not consolidated by cessation of growth, calcification, and ossification of the epiphysial cartilages and final union of the annular epiphyses until about 23 to 24 years, when all growth has ceased in the long bones.

The growth in length of the spine as a whole is most rapid in the first two years of life, when it increases from eight inches to sixteen and a half inches. Growth is then fairly regular and does not show the spurts which are registered so frequently in the lower limb. The adult spine in the male approximates closely to twenty-eight and a half inches and in the female to twenty-four and a half inches. Growth in the spine is not truly proportional, but takes place at varying rates in different parts,

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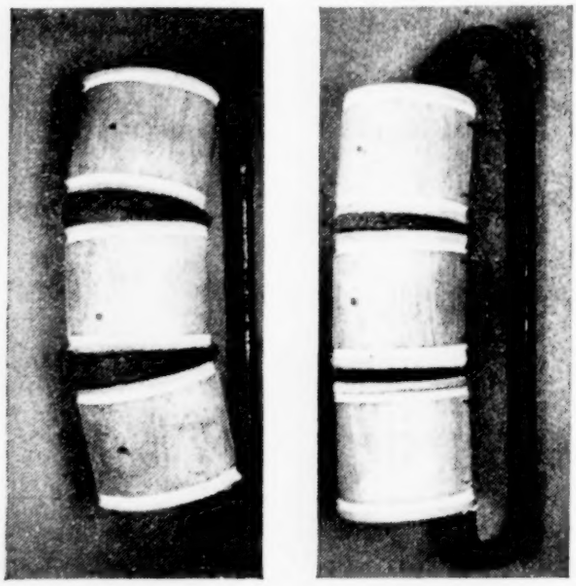
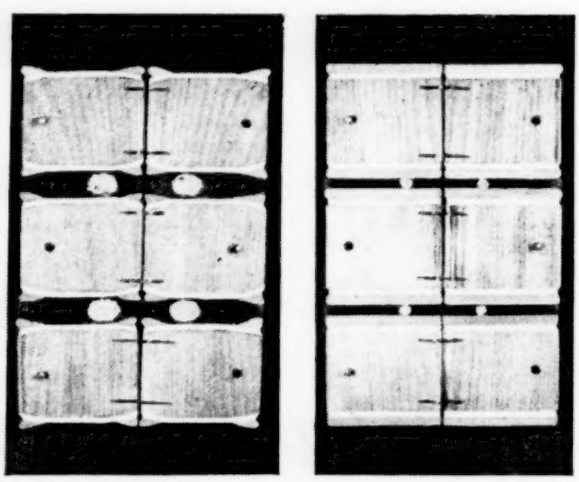
particularly during the first seven years of life. Roughly speaking, at birth the cervical, lumbar, and sacral parts of the spine each contribute one-fifth of the total length, the dorsal or thoracic region occupying two-fifths. From birth to adult life the spine increases in length by three and a half times, but whereas the cervical region



Man Sheep

FIG. 2.—Model of the lumbar vertebrae in man and sheep in the position of extension to show the relative proportions of the fibrocartilaginous disks, the vertebrae, and the bony epiphysial annuli or plates which lie above and below each vertebra with an intervening plaque of growth cartilage



Man Sheep

FIG. 3.—The same models in section to show the increased thickness of the fibrocartilaginous disk and the reduction of the plate-like epiphysis of the sheep to an annulus in man. The nucleus pulposus is nearer the posterior surface of the vertebra and may be dislocated posteriorly.

increases threefold the lumbar region increases fourfold, so that the greatest growth is in this region and is associated with the great growth in the lower limb—the skin, musculature, and joints of which are largely supplied by lumbar nerves.

The growth in transverse dimensions of the spine is determined essentially by the growth in the spinal cord. At 6 years of age the spinal canal is larger than in the adult and the spinal cord is almost adult in cross-section. This precocity in growth of the spinal cord determines the time of onset of calcification and ossification in the neurocentral synchondrosis. Moreover, the epiphysial rings above and below each vertebra are an index of the attempt so to modify and control the growth of the spine that spine length shall be almost constantly twenty-eight and a half inches in the male and twenty-four and a half inches in the female, in accord with a spinal cord length of eighteen inches and sixteen and a half inches respectively. This relative lack of variation in spine length in the two sexes accounts for the trade in ready-made shirts, coats, and corsets, of given length but varying girths. Throughout puberty and adolescence the spine does its utmost to reach its normal length, irrespective of stature.

The Intervertebral Disks

The intervertebral disks are more complicated in structure than the vertebrae themselves. The nucleus pulposus at the centre is essentially a remnant of the primitive notochord. This is surrounded by the annulus lamellosus, which consists of concentric lamellae of fibrous tissue, some of the fibres circular, some spiral. Above and below this element are two cartilage plates bounding the adjacent vertebrae. Some fibres are inserted into the cartilage plate, some into bone, and some into the anterior and posterior common longitudinal ligament. George Murray Humphry (1858) described the nucleus pulposus as a "fluid ball girt by surrounding bands of fibrous tissue . . . which the adjoining vertebrae rotated in their movements on one another." This ball-bearing function of the nucleus pulposus is of the utmost importance, for the disks as a whole are more susceptible to age changes and to injuries than the bony vertebrae themselves.

The growth of the intervertebral disks is extremely interesting. At birth the nucleus pulposus is small and the disk is relatively narrow. The lamellae of fibrous tissue develop after birth and are distinct entities at 6 months, when the child is first able to hold up its head. With age the fibrous rings grow at the expense of the adjoining cartilage plates. At birth approximately one-third of the total length of the spine is due to the disks, which are practically half as deep as the individual vertebrae. At 7 years of age and on to adult life the disks account for one-fifth of the total length, so that they are roughly one-quarter the depth of the vertebrae. But the thickness varies considerably in different parts of the spine. Between the shoulders, in the upper thoracic region, the disks are thin, in accord with the reduced movements of flexion and extension in the vertebrae of a region subjected to the pull of the large muscles of the head and neck and upper limb. The disk between the second and third cervical vertebrae is thinnest of all. In the lower dorsal region the disks gradually increase in thickness, reaching their maximum in the lumbar region. This is due partly to the range of movement between the neighbouring vertebrae and partly to the large area of the contiguous surfaces which naturally tends to restrict the range of movement.

From birth to adolescence the total depth of the disks increases from 0.3 in. to 0.7 in. in the cervical region, from 0.65 in. to 1.45 in. in the dorsal region, and from 0.42 in. to 1.7 in. in the lumbar region. Thus the outstanding feature of the spine in man is the great size of the lumbar vertebrae and still more the thickness of the lumbar disks. In all quadrupeds the epiphyses of the vertebrae are relatively thick plates instead of rings, and the disks are relatively thin. Only in man and the great apes are the plates reduced to rings and the lumbar

disks increased so much in thickness. The range of movement and the large cross-sectional area in the lumbar and lower cervical spine are associated with the attempt to assume and maintain the erect attitude. Man alone has massive lumbar vertebrae, thick lumbar disks, annular epiphyses, huge buttocks, massive quadriceps, and long lower limbs. Even the gorilla, chimpanzee, and orang have failed to grow buttocks. It is only within recent years, as the result of the earlier isolated studies of Schmorl (1931) in Dresden, that the frequency of lesions in the intervertebral disks has been appreciated. More than 80 per cent. of these lesions are in the lumbar region, according to a recent report from the Mayo Clinic (Waish and Love, 1939).

Most of the exercises found in the handbooks of physical training, if employed without due care and supervision, may tend to abuse these recently acquired and peculiarly human features of the spine. Toe-touching and trunk-twisting are fraught with danger, particularly at such ages and in such types of build as are characterized by relatively long legs and short arms. Mobility of the spine, like the back view of the torso, is largely an individual characteristic. The rough-and-tumble of ball games is less dangerous than squad drill or organized "jerks."

The Upper Limb

The shoulder-blade in childhood consists of two bony elements—the scapula and coracoid—separated by a band of actively growing cartilage. Thus the shoulder-joint comprises on the one hand the head of the humerus and on the other the glenoid cavity, consisting of two elements separated by an intervening band of cartilage, the scapula occupying two-thirds and the coracoid one-third. This cartilage is a growth cartilage and allows the glenoid cavity to grow in accord with the head of the humerus. In all the main joints of the body Nature attempts to provide facilities for growth by arranging that a convex surface on one bone shall articulate with a concave surface on another two or three bones, these bones being separated by a growth cartilage. Like all growth cartilages, the intra-articular ones are separated from the adjoining bone by a narrow band of calcified cartilage. It follows that the shoulder-joint of the growing child is much more complicated than that of the adult, in that the glenoid contains two bones, coracoid and scapula, and the articular cartilage overlies growth cartilage, calcified cartilage, and bone.

During puberty the growth cartilage ceases to grow, calcifies, and ossifies. It is at this age, when the scapula and coracoid are becoming firmly knit, that the muscles of the neck and upper limb display active growth. The development of the neck and chest is rapid, as is that of the biceps and triceps. The boy begins to "throw his weight about" in more senses than one.

Union of the epiphyses takes place at the elbow earlier than at the wrist and shoulder. Thus fairly heavy muscular work involving the elbow-joint, such as bench work, is more easily faced by the adolescent than heavy muscular work involving the wrist and shoulder, such as coal-mining, quarrying, and heaving. Any undue load on the musculature of the upper limb, such as frequent and persistent throwing of the cricket ball, or carrying a heavy hod of bricks up a ladder, is to be deprecated; for not only is there danger to the upper limb itself, particularly the shoulder-joint, but there is danger to the upper thoracic and cervical spine, to which are attached the muscles involving violent movements, such as the trapezius, and the muscles involving fixation, such as the rhomboids. Abuse of the upper limb muscles is a threat to the slender upper thoracic spinal column and the enclosed spinal cord.

Pelvis and Lower Limb

The sacro-iliac joint is formed by the auricular surface of the ilium and that of the sacrum. The sacral surface is complex, and consists of the bony costal elements of the first three sacral vertebrae, separated by fibrous tissue and cartilage. The ossification centre for the first and second sacral "ribs" is present before birth and that for the third "rib" appears soon after birth. At puberty a thin epiphysial bony plate appears in the cartilage on the auricular surface of the sacrum. This bony plate unites relatively late in adolescence and is associated with the late date of union of the first and second sacral vertebrae. Thus the sacro-iliac joint is definitely one in which the age changes and the number of separate elements involved are such as to call for the greatest care in its use. The common practice in secondary schools for girls to spend hours in jumping over a high rope is to be deprecated. Lastly, since the sacro-iliac joint is devoid of a cavity lined by synovial membrane it is, like almost all the vertebral joints, one which can be injured or diseased without pain becoming a cardinal symptom. The fact that pain may be absent in joints which are injured or diseased should be continually present in the minds of physical training instructors.

The hip-joint in the child displays the general rule that a joint will be formed if possible between more than two skeletal elements. The convex spherical head of the femur articulates with four other elements consisting of ilium, ischium, pubis, and the triradiate cartilage which separates the three constituent bones. In all animal forms the triradiate cartilage is a true growth cartilage and is separated from the neighbouring bones by thin strips of calcified cartilage. About puberty the growth cartilage ceases to proliferate, calcifies, and ossifies. The ossification is often patchy, and so accounts for the irregular features displayed radiologically in the cartilage by the so-called os acetabuli. Thus, from puberty to adolescence the hip-joint is even more complicated than the shoulder-joint. The bearing surface in the acetabulum, by reason of the growth at the triradiate cartilage, gives rise to many of the deformities and diseases of the pelvis. The hip-joint is often considered only in terms of the head of the femur. The hip-bone is forgotten.

Mention should be made of the cartilage at the conjoined ischio-pubic ramus, over which is attached the crura of the penis. Union of the two rami by calcification and ossification of the cartilage usually takes place at about 8 to 10 years of age. This area of union is liable to disease, and is particularly liable to injury by falls on the edge of a chair, rail, fence, gymnastic apparatus, or by jumping on to a bicycle. Such injury or disease is difficult to diagnose, and may eventually appear as an abscess in the adductor muscles or an osteomyelitis following an osteochondritis. Injury of any part of the pelvis may lead to bony union of the sacro-iliac joint on one or both sides.

The first thoracic nerve and ulnar nerve in association with cervical rib, and the fourth and fifth lumbar nerves in association with sacralization of the fifth lumbar vertebra, and several other anatomical anomalies, call for special care. Space does not permit a detailed account, but one may say that the ulnar nerve and the lower two lumbar nerves are always living dangerously.

Need for Caution in Physical Training

I do not wish to be regarded as an opponent of all forms of physical training, but the anatomical and physiological basis of such training is a subject which calls for cautious research on the part of all concerned. As Cathcart *et al.* (1935) state, no certain index of physical fitness, industrial or other, has yet been discovered. It is essential that we should ask if the boys and girls of this country are to be submitted to as expensive and unproductive a course in physical training as that to which they have been subjected in Latin and French. Many children in Wales have learnt to speak Welsh and English at home by 3 years of age without tears and without specialist teachers. Countless children have learnt to play, to work, and eventually to support themselves and a family without being subjected to lifting, throwing, hitting, gripping, swinging, bending, and twisting by numbers in regimental formation. To be born in a comfortable nest, den, or house, to have adequate food and unorganized free play—these are Nature's own essentials for physical training.

The ideal of *mens sana in corpore sano* is essentially a demand for two distinct attributes of mind and body that are not necessarily closely related. Between intelligence and common physical measurements such as height and weight there is but a low correlation, which decreases still further during adolescence. There is practically no correlation between mental intelligence tests and the physical measurements most commonly studied in children. There is a positive correlation between the mental test scores and the precocity of puberty in school children. On the other hand, slow rate of development is a peculiarly valuable human feature: apples which ripen most slowly last longest.

No two children progress towards maturity at the same pace, yet natural forces have a way of reducing the differences to some extent as maturity is approached. It is an impossible and unnecessary task to make all children conform to a standard rate of growth, to attain a standard developmental pattern or a standard physical performance test in terms of age.

Chronological age in itself is a snare, for the most developed of a group of 9-year-old children will often be more mature than the most immature of a group of 12-year-olds. Attempts at substituting skeletal age in terms of ossification of the carpus and hand, or mental age in terms of intelligence tests, are equally dangerous. Children are parts of the group in which they live, but they are also individuals who have a right to develop at their own pace.

Posture and Attitude

"Posture" is not a question of physical exercises, physical jerks, or training of the muscles. Posture is essentially the *nervous* (not *muscular*) mechanism which "keeps the world right side up for the organism by keeping the organism right side up to the external world" (Sherrington, 1906), as a result of the co-ordination of visual and labyrinthine stimuli with stimuli from the proprioceptive nerve endings in muscles, tendons, and joints. The midbrain contains the important group of centres concerned in the acquirement and maintenance of equilibrium and posture.

"Posture is the solid foundation upon which perception is built, and it is of such pre-eminently vital importance to the animal that it is subserved almost entirely, even in Man, by a dyscritic (protopathic) mechanism. Posture is a relatively static condition, maintained indefinitely so long as circumstances remain relatively unaltered: so far it demands a plastic pose, subserved by tonic impulses and muscular contractions. Posture on the verge of change assumes a dynamic aspect and becomes an *attitude*, in which the distribution of tone in various muscles is in a sense precurrent—prepared for active movement" (Parsons, 1927).

Even attitude, posture on the verge of change, is subserved almost entirely by a protopathic mechanism.

Much of the physical drill is directed towards the acquirement of an attitude rather than the maintenance of a pose. The soldier on parade too often exhibits attitude—not posture. The maintenance of attitude involves continuous conscious endeavour. The maintenance of a natural posture is automatic and involves the minimum of mental and physical fatigue. A natural "posture" does not lead to fainting; a forced "attitude" may, as is so well known on parade or at morning prayers. If one watches a group of children playing "blind man's buff" one may see and analyse the various elements concerned in the maintenance of posture. The "righting reflexes" can be classified as:

1. Labyrinthine reflexes tending to restore the position of the head to the normal.

2. Reflexes arising in the muscles of the body wall so that, if the trunk be bent to the right, muscle tonus is increased on the left as a preparation for restoration of the trunk and head to the erect position.

3. Reflexes arising in the muscles of the neck as a result of the reflexes initiated in the labyrinth with a view to rapid restoration of the position of the head on the neck, irrespective of the position of the trunk and limbs.

4. Reflexes arising in the muscles of the trunk and limbs as a preparation for the necessary movement to maintain balance and equilibration.

5. Reflexes arising in the retinae with a view to acting on the muscles of the neck, trunk, and limbs in such a way as to retain the visual field so far as possible in its normal orientation.

6. Reflexes arising in the skin of the soles of the feet.

The extent to which the visual mechanism is concerned is clearly seen in the different movements, particularly of the upper limbs, in the blindfolded and the normal child. The effect is still more exaggerated if the ground surface becomes more rough and irregular, or if the blindfolded one is spun a few times, and even more so if the child is blind in one eye, deaf in one ear, crippled in trunk or limb, wry-necked, or suffering from cold feet. The maintenance of posture is controlled in most mammals by the midbrain. In fact, it is entirely so in the guinea-pig and rabbit. The visual cortex of the cerebrum is concerned with the ocular "righting" reflex to an increased degree as one passes from cat, dog, and monkey to man. One may regard the maintenance of posture as fundamentally a protopathic mechanism which in man has become augmented by an epicritic mechanism dependent upon the ocular reflexes and the power of binocular vision localized in the visual cortex.

In assessing alike the stance and the poise of children it is important to remember that the widely accepted appreciation of military "smartness" has no anatomical or physiological basis. Military drill is designed to make a group of different individuals look alike and act alike synchronously. It is the worship of uniform and of uniformity. Physical training should involve something distinct from regimentation. It should aim at the cultivation of the maximum efficiency consonant with the neuromuscular equipment of the individual.

The feats of daring, of physical and mental endurance, the lonely watches and the forced marches, whether at the Equator or the Poles, on the Himalayas or in the Arabian Desert, have been a product of the spirit of the British race, not of the gymnasium or the barrack square. Drake, Cook, Scott, Lawrence, and Somerville are not the product of any system of physical education or sport. Among the golden words of the English language are those in Captain Scott's farewell letter to his wife:

"Make the boy interested in natural history if you can; it is better than games: they encourage it at some schools. I know you will keep him in the open air.

"Above all, he must guard and you must guard him against indolence. Make him a strenuous man."

Bodily Habitus, Constitution, and Health

In the Report on the Primary School (Harris, 1931), when discussing the four physical types—hypersthenic, sthenic, hyposthenic, and asthenic—it was emphasized that any one type of bodily habitus and visceral topography cannot be radically altered. Concentration should be directed towards making each child efficient within his group. In view of recent attempts to classify children in terms of psychological characters in relation to bodily habitus a word of warning is necessary. There is much nonsense talked about "constitutionalism." Prejudices, beliefs, sentiments, and that authoritarianism which is the pitfall of the educationist play a large part in the prevailing fashionable beliefs. The canons of statistical sampling are rarely satisfied, and it is essential that much of the fashionable talk about the pyknic child or the asthenic child, particularly in relation to his mental and emotional qualities, should be recognized as the result of amateurism and unwarranted speculation. In a recent survey of 500 asthmatic and 500 rheumatic children in one of the large hospitals (Young, 1933) no distinct difference in anthropometric measurements or body build was found.

Mankind has always been dominated by a belief in the mental significance of particular physical features. Chaucer, Shakespeare, and Dickens have impressed upon us an association of this type. Modern playwrights, novelists, and, above all, the cinema, exaggerate it. At present there is no scientific evidence that any of the accepted criteria of the relation of mental qualities to physical traits are sound. Goring (1913) effectively destroyed the belief that the possessor of the "high brow" was more intelligent than he of the "low brow." Pearson (1906) has proved that "it is impossible to use head size as a basis for judgment as to intelligence." He proved that eye colour and hair colour are as closely related to intelligence as are head diameters.

The intelligence tests of Binet, the study of skeletal development by *x* rays, the measurement of height and weight of the body, and of the head in particular, have yielded nothing more definite than that little correlation exists between mental and physical status. On the other hand, the various attempts to correlate the type of body build with temperament have been somewhat more successful. Draper (1930) in America is of the opinion that certain types of body build are associated with a predisposition to certain diseases. Kretschmer (1925) in Germany connects body build with temperamental disposition. It is probable that Alfred Adler's (1938) theory of "organ inferiority," based upon a demonstrable physical deficiency, is the only field in which definite correlation has been proved between physique and temperament.

In short, apart from disease of the central nervous system and grave physical defects, the prevailing notions as to the relation of *mens sana* and *corpus sanum* have been grossly exaggerated. Malnutrition, poverty, dirt, and even a succession of acute or chronic diseases do not seem able, of themselves, to subdue the master organ of the body, the brain, to any considerable extent. On the other hand it is obvious that malnutrition, poverty, dirt, disease, and war do wipe out individuals, families, and races. The effect on the race or the breed should not be confused with the effect on the brain of the individual.

The psychological effects of class gymnastics have not been considered any more than the psychological effects of grooming, dress, and personal adornment. The present problem is anatomical and physiological. Growth, development, posture, like health, depend to a large extent on the freedom for the individual to join in any play, game, or sport, to exert himself according to his powers, and to know when he has had enough. Food, fun, and frolic are of more importance than drill and discipline.

Summary

The pattern of growth in the spine, upper limb, and lower limb is described.

The difference in the structure of the spine in man from that of quadrupeds is discussed in its relation to the assumption of the erect attitude in man.

Posture is considered as a nervous mechanism, and emphasis is laid on the importance of the "righting reflexes."

The fixity of bodily build or habitus in an individual is emphasized.

Food, play, and free unorganized games in early childhood are discussed in their connexion with healthy growth and physical training.

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Asthma.—In thirty-seven of fifty unselected cases of bronchial asthma from a clinic for allergic cases an emotional component could be seen in the aetiology of their attacks. The thirteen others were predominantly young males. Of those with a large emotional component only 20 per cent. were benefited by somatic therapy, as against 54 per cent. of the "non-emotional group." Thirty of the patients showed long-standing neurotic traits, usually of an obsessional character.—Psychiatric Survey of Fifty Cases of Bronchial Asthma. T. N. McDermott and S. Cobb.—*Psychosomatic Med.*, April, 1939, **1**, 203.

SULPHAPYRIDINE (M & B 693) AND PNEUMOCOCCAL INFECTIONS*

BY

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The purpose of this paper is to review briefly the main facts relating to sulphapyridine, and particularly to deal with its use in combating pneumococcal infections. Although only eighteen months have elapsed since Lionel Whitby[1] first published his discovery of the value of sulphapyridine, yet in this short time a large number of papers concerning it have been published in many countries. It is now established that sulphapyridine is a most effective agent against infections by pneumococci of all types.[1-6] In its action against the pneumococcus it represents an outstanding medical advance, for it is superior to specific antiserum and unapproached at present by any other sulphonamide compound. The chief evidence for these statements has been provided by the case series[7-26] summarized in Table I, reporting

TABLE I.—*Mortality of Cases of Lobar Pneumonia Treated with Sulphapyridine*

	Total of Treated Cases	Deaths
Africa :		
Agranat *et al.*[7]	98	8
Anderson and Dowdeswell[8]	50	1
Canada :		
Graham *et al.*[9]	50	3
Meakins and Hanson[10]	30	1
Denmark :		
Alsted[11]	28	1
Eldahl[12]	54	4
Hjorth[13]	28	0
Lundsteen and Mogensen[14]	39	2
Finland :		
Saltzman[15]	100	6
Great Britain :		
Anderson *et al.*[16]	70	6
Banks[17]	30	0
Dyke and Reid[18]	8	0
Evans and Gaisford[19-21]	627	34
Marriott[22]	25	0
Norway :		
Römcke and Vogt[23]	254	11
U.S.A. :		
Janney-Smith and Needles[24]	50	4
Pepper *et al.*[25 90 91]	400	28
Williams and Morgan[26]	50	1
Totals	1,991	110

Average mortality, 5.5 per cent.

These series contain patients of all ages, but no series entirely composed of children is included. In the series of Agranat *et al.* I have excluded their native miner groups as being not comparable with the other series. In these miners so excluded there were only two deaths in 172 cases.

results in lobar pneumonia from various parts of the world. It has uniformly been found that the average gross mortality of cases treated with sulphapyridine is about 5 to 8 per cent., as compared with 20 to 30 per cent. in the former experience of the hospitals concerned or in control series.

In regard to infections by organisms other than the pneumococcus, the value of sulphapyridine relative to other sulphonamide compounds awaits final definition. Present opinion[1-6 27] suggests that: (1) it is about equal, or slightly superior, to sulphanilamide against haemolytic streptococci, meningococci,[28-33] Friedländer's bacillus, *Clostridium welchii*, and *B. coli*[34]; (2) it is the most effective of the sulphonamides against the gonococcus[35-44]; (3) it is the least ineffective against *Staphylococcus aureus*[22 45-47] and *Streptococcus viridans*[1 22 48]; (4) it may be of value against *B. typhosus*,[49] *B. pestis*,[50] and *B. influenzae*.[51] At the present time sulphapyridine is undoubtedly the drug of choice for empirical use in any fever of uncertain causation probably due to bacterial infection.[27]

* Partly based on a paper prepared for the Annual Meeting of the Danish Medical Society to have been held on September 24, 1939, at Aarhus.

Pharmacology of Sulphapyridine

Sulphapyridine is chemically 2-sulphanilyl-aminopyridine. It is a white powder, almost insoluble in water. It is, however, fairly rapidly absorbed[52-54]; the maximum blood concentration from a single dose is usually reached in about four hours. Thereafter the concentration slowly falls to zero in approximately forty-eight hours. In the blood the free form of the drug is slowly converted to the conjugated or acetylated form; the former is said to be therapeutically active, and the latter, which is even more insoluble, is said to be inactive. In twelve hours about half the sulphapyridine from a single dose is acetylated. The rate of acetylation appears to vary in different persons; it has been suggested that it may bear relation to the metabolic rate.[55] The kidneys are almost the sole channels of sulphapyridine excretion, and the free and acetylated forms are found in the urine in various amounts.[56] In the body fluids, such as cerebrospinal fluid, pleural fluid, or pus, the concentration of sulphapyridine is usually between 50 per cent. and 100 per cent. that of the blood at the same moment.[5 9 30 54 56] The ready distribution of sulphapyridine between the blood and the body fluids renders intrathecal or intrapleural administration unnecessary.

How sulphapyridine produces its remarkable effects is still unknown.[57 58] Both *in vitro* and *in vivo* there is a lag period of six hours during which organisms multiply in spite of contact with the drug. Then the organisms increasingly die off[1 2 57] from what appears to be direct action of the drug upon them.[1 2 59 60] It may be that the effect of the drug is the production of bacteriostasis, from starvation of the organisms due to inhibition of their enzymes,[57 67] and that the body does the actual killing of the invaders.[61-65] However, there does not seem as a rule to be any evidence of exceptional stimulation of the body's defence mechanisms,[57] nor indeed of interference with them.[66]

Pneumococcal Infections of the Respiratory System

As before stated, the outstanding value of sulphapyridine against the pneumococcus was first convincingly demonstrated clinically in relation to lobar pneumonia. This demonstration was achieved by Evans and Gaisford[19] following upon Whitby's discovery of the potency of sulphapyridine in the treatment of pnenumococcal infections in mice.[1] The well-defined clinical course of lobar pneumonia renders recognition of the beneficial effect of the drug easy. Many confirmatory series[7-26] and striking individual cases[59 69-74] have been published. The principal points now established concerning the sulphapyridine treatment of lobar pneumonia are:

1. The average reduction in gross mortality is such that three patients out of four who would formerly have died may now live.

2. Sulphapyridine is particularly valuable in severe cases with bacteriaemia.

3. The drug is as effective in the elderly as in the young. In persons of 50 and upwards gross mortality in the past[20 23 75 76] has usually been accepted as approaching in percentage figures the figures of the subjects' ages. In Table II are extracted from the main case series,[7-26] which give the requisite data, the mortality of all patients aged 50 or more treated with sulphapyridine. The average mortality is seen to be 16.6 per cent.

TABLE II.—*Mortality of Cases of Lobar Pneumonia, aged 50 or More, Treated with Sulphapyridine*

	Total of Treated Cases	Deaths
Agranat *et al.*[7]	15	1
Graham *et al.*[9]	15	3
Meakins and Hanson[10]	6	1
Alsted[11]	5	0
Eldahl[12]	14	3
Hjorth[13]	8	0
Lundsteen and Mogensen[14]	14	2
Anderson *et al.*[16]	9	3
Dyke and Reid[18]	2	0
Evans and Gaisford[19-21]	86	21
Marriott[22]	9	0
Römcke and Vogt[23]	61	8
Pepper *et al.*[25]	124	19
Totals	368	61

Average mortality, 16.6 per cent.

4. Sulphapyridine appears to be very effective against pneumococci of all types.

5. Within twenty-four to thirty-six hours of sulphapyridine being begun, irrespective of the day of the disease, the temperature falls by rapid lysis and there is usually remarkable improvement in the patient's general condition. Uneventful recovery in most cases ensues, but the local condition in the lung does not seem to undergo resolution any faster.

6. The incidence of empyema appears lessened, but clear pleural effusions are commoner. Evans and Gaisford[20] regard the latter as empyemata aborted by sulphapyridine, since in their experience the total of empyemata plus clear effusions is the same as used to obtain for empyema alone.

7. In cases of lobar pneumonia treated with sulphapyridine specific agglutinins against pneumococci develop between the fifth and twelfth days of the disease as they do in untreated cases[66]; their appearance is unaffected by the drop in temperature caused by the drug. This development of agglutinins by the body does not occur in cases effectively treated with specific anti-pneumococcus serum.[66]

The excellent results in lobar pneumonia are paralleled in the less clearly defined pneumococcal chest infections. Results in bronchitis, bronchopneumonia,[11 19 22 56] and post-operative pneumonia[68] are good.

Pneumococcal Meningitis and Peritonitis

Pneumococcal meningitis has in the past been generally considered to be invariably fatal. Sulphapyridine permits revision of the hopeless prognosis, though the condition is still to be regarded as very serious. A number of cures[77-84] and a number of failures[81 85-87] have been reported. In meningococcal meningitis sulphapyridine, like sulphanilamide, is extraordinarily successful. Not infrequently in practice the exact bacteriological diagnosis in a case of meningitis is not immediately obtainable. In all such cases, where the infecting organism is in doubt, sulphapyridine should be given[81] because not only is it the best agent against the pneumococcus, but it is as good as or better than sulphanilamide against meningococcal, streptococcal, and staphylococcal infections.

The prognosis in pneumococcal peritonitis is also likely to be very much changed for the better by sulphapyridine. Barnett and his associates[56] record three cases of pneumococcal peritonitis in children treated with sulphapyridine (one received serum too), and MacColl[88] has also published a similar case. All four recovered. Chemotherapy,[120] combined with the other recently introduced measures of gastro-duodenal suction drainage and continuous parenteral fluid administration, will enormously reduce the mortality in all forms of peritonitis.

Toxic Effects of Sulphapyridine

Dangerous toxic effects from sulphapyridine in therapeutic doses are rare.[7-26] Gaisford, Evans, and Whitelaw,[89] in more than 1,000 cases, have not met with any serious complications due to the drug. Pepper and his associates[25 90 91] have administered sulphapyridine to 500 patients without a death attributable to it.

Nausea or vomiting occurs in about half of all patients receiving sulphapyridine; the incidence is said to be less in children. In addition many patients feel depressed and languid and may have headache. These effects are unpleasant but not of serious significance. The vomiting appears most likely to be due to a central effect rather than to local gastro-irritation as was at first supposed. Cyanosis is less often seen with sulphanilamide. According to Campbell and Morgan[92] the cyanosis due to sulphapyridine is from methaemoglobinaemia and not from sulphaemoglobinaemia as with sulphanilamide. Methaemoglobinaemia does not persist as long as sulphaemoglobinaemia. If considered to be dangerous, because affecting already anoxic patients, it may be quickly abolished by the administration of methylene-blue.[9 56 92] This should very seldom be necessary.

Not strictly a toxic effect, but an effect consequent upon its insolubility, is the formation in the urine of jagged crystals or small calculi of acetylated sulphapyridine. The subject has been studied in laboratory animals.[93 94] In patients receiving sulphapyridine red cells are found in the urine in a small proportion of cases. Rarely, gross haematuria, ureteric or bladder pain, and anuria may occur.[9 12 21 25 93 95] Such effects have, however, been inconspicuous in the experience of observers of large series.[7-26] There is evidence that they are commoner in children, perhaps because of relatively larger dosage.

When sulphapyridine administration is continued beyond five days, which should not as a rule be necessary, drug fever and rashes[99 100] become unpleasant and not infrequent features. The rarer but very dangerous manifestation of granulocytopenia may also occur.[101-110] With drug fever the temperature may rise as high as 104° F. The rashes[99 100] usually resemble the rashes of measles or German measles; occasionally they are urticarial or scarlatiniform. Differential diagnosis from the mentioned specific fevers may be difficult.

Dosage and Practical Points in Administration

It is necessary in treating pneumonia to aim at securing and maintaining a blood concentration of sulphapyridine of not less than 4 mg. per 100 c.cm. In adults this level is usually achieved by a dosage of 2 grammes, followed in four hours by 2 grammes, followed by 1 gramme four-hourly.[2] What sulphapyridine does it does quickly, but at the same time too early discontinuance may lead to relapse from spread of infection. Hence, after the patient has received a total of 18 grammes on the above scheme of dosage (that is, after two and a half days) the dose should be reduced to 0.5 gramme four-hourly for twenty-four hours and then to 0.5 gramme eight-hourly for thirty-two hours—a total of 23 grammes administered on a decreasing scale during five days.

For children the dosage should be in proportion to the body weight,[19] but it is desirable to increase the dose relative to that of adults by 50 per cent. to secure adequate blood concentrations of sulphapyridine. Wilson and his collaborators[111] advise doses equivalent to twice those usually given to adults.

The estimation of sulphapyridine in the blood and body fluids is possible by relatively simple methods,[6 54 112-114] and checking of the blood level is important if there is any doubt in regard to the attainment of an adequate

concentration. This may be of particular importance if there is much vomiting. The same dosage should be used whether the infection is mild or severe.[3] The tablets should be administered crushed and suspended in water, milk, or fruit juices. In general the course of treatment should be neither less nor more than five days. Less may result in incomplete cure. More brings the risk of complications,[2] and particularly the grave danger of granulocytopenia; if continuance is deemed desirable, then close watch should be kept on the skin and temperature, and blood counts should be made on alternate days.

In all cases the ordinary general measures of medical and surgical treatment should be carried out. An adequate intake of fluid is of the greatest importance to avoid urinary crystallization.[97] Five pints (2,850 c.cm.) per twenty-four hours should be taken by an adult. The urine must be measured, and an output of less than 50 oz. (1,400 c.cm.) per twenty-four hours regarded as unsatisfactory. The urine should be examined daily for blood. Liberal administration of glucose is desirable not only because of its nutritional value but because it helps to prevent nausea and vomiting. In anoxic cases oxygen administration should not be delayed; Whitehead and Carter[74] suggest that it may abolish nausea and vomiting.

Sulphapyridine is not a substitute for surgery. Collections of pus must be drained in accordance with established general principles. Vomiting is not an indication for stopping or reducing sulphapyridine. If administration is persisted with it is often found that the vomiting decreases or ceases.[2 9] If an adequate blood concentration of sulphapyridine is not being sustained, then it may be necessary to pursue administration by the rectal introduction[56] or intramuscular[84 89 117] or intravenous[118] injection of the soluble sodium salt.[3 115 116] This salt is now put up in ampoules containing 1 gramme in 3 c.cm. This amount may be given intramuscularly four-hourly. It should not be given subcutaneously because its high alkalinity causes severe pain and may induce sloughing. The technique of intravenous administration is not fully worked out; there would seem to be considerable possibilities in continuous-drip administration of dilute solutions. It might be possible to achieve rapidly and regulate accurately optimum blood levels.

When sulphapyridine is being administered it may induce photosensitivity in the patient. Hence exposure to strong natural or artificial sunlight must be avoided; such exposure may result in severe dermatitis.[101] During the time the drug is being given it is very important that other drugs with a tendency to produce granulocytopenia, such as amidopyrine, should be avoided. In conditions such as gonorrhoea sulphapyridine may sometimes unavoidably be administered to ambulant patients. Like the other sulphonamide drugs, it may produce impairment of judgment of speed and distance.[119] Patients taking it should be prohibited from driving cars or flying until two days after the last dose.

There is no antagonism between sulphapyridine and any form of associated treatment.[3] In particular there is no reason why it should not be used in conjunction with serum[121 122] or vaccines[61-64] in pneumonia or other conditions.

Summary

The main facts relating to sulphapyridine are reviewed and special attention is paid to its use in pneumococcal infections.

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In maintaining the flow of arms and munitions the health and well-being of the industrial worker is clearly of the utmost importance, and no single factor has greater influence than the provision for nourishing and attractive meals during the hours of work. Industrial canteens have long been established, but the conditions of war production are likely to increase their usefulness greatly and to add to the number of firms who find it necessary to make arrangements for meals during working hours. The extension of the hours of work, the increase of night shifts, difficulties in transport, "black-out" conditions, all contribute to the strain of wartime production; the evacuation of the family often includes the wife of the industrial worker, and the industrial canteen to-day not only meets the needs of the workers during work hours, but in many factories canteens are already providing facilities for breakfasts and suppers for those workers who are left without anyone in their homes to prepare these meals. How best to organize canteen facilities is the practical question which the Industrial Welfare Society has attempted to answer in a booklet, *Canteens in Industry*, issued at 1s. from 14, Hobart Place, S.W.1. Though primarily concerned with the organization of canteens in industrial concerns, most of the booklet should be no less useful to those responsible for the provision of meals in schools, hospitals, or other institutions, or to those now arranging meals for evacuated school children and mothers and for A.R.P. workers.

PRODUCTION OF ANTIGONADOTROPHIC ACTIVITY IN MAN BY INJECTION OF EXTRACT OF PREGNANT MARES' SERUM

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The presence of a gonadotrophic substance in the serum of mares during the second and third months of pregnancy was discovered by Cole and Hart (1930). Highly purified extracts are now prepared from this source and are used clinically for various manifestations of hypogonadotrophism. In common with gonadotrophic extracts of the anterior pituitary gland and of human urine of pregnancy, the prolonged injection of extract of pregnant mares' serum to animals of a different species from that from which the preparation originated does not cause prolonged stimulation of the reproductive organs (Meyer and Gustus, 1935). This refractoriness is caused by the appearance in the blood of inhibitory substances, which can be demonstrated by the fact that the serum of desensitized animals has the power to inhibit, in other test animals, the activity of the extract in question.

The formation of these substances in the blood as the result of prolonged treatment with gonadotrophic extracts is likely to set a limit to their use as therapeutic agents. It was observed previously, however, by Spence, Scowen, and Rowlands (1938) that the prolonged administration to human patients of extracts prepared from the urine of pregnant women did not evoke the formation of these inhibitory substances, so that treatment could be carried on indefinitely. The presence of such inhibitory substances in the blood of man treated with extract of the serum of pregnant mares does not seem to have been demonstrated, but, as will be seen below, they are undoubtedly produced. It is obvious, therefore, that to continue treatment after such substances have formed would be futile, as most, if not all, of the extract would be neutralized in the circulation. Until a level of dosage and a method of spacing the injections have been found which will not induce the formation of these inhibitory substances care must be exercised in the clinical use of extracts of pregnant mares' serum.

Methods

PRODUCTION OF ANTISERUM

Nine patients with undescended testes were injected intramuscularly with a gonadotrophic extract prepared from the serum of pregnant mares by N.V. Organon (Oss, Holland). The extract was assayed in "rat units" by the manufacturers, there being at that time no international unit. An international standard and a unit defined in terms thereof are now being established,* however, and enough information is available to allow of an approximate estimate of the activity, in international units, of the serum preparation used. The manufacturers stated that 150 µg. was equivalent to 1 "rat unit," but the dosage

* See *Bulletin of the Health Organization of the League of Nations*, 1938, **7**, 894.

is recorded here in milligrammes—1 mg. being found to be approximately equal to 80 international units.

Three of the patients (Nos. 32, 19, and 18) were injected daily for twelve weeks with 6, 12, and 13.5 mg. respectively. The remaining six patients were divided into two groups: (*a*) three (Nos. 24, 25, and 26) who were injected with 18 mg. twice weekly for twelve weeks; and (*b*) three (Nos. 22, 23, and 27) who were injected with 36 mg. twice weekly for a similar period.

Immediately before treatment blood samples were taken from the median basilic vein, and subsequently as near as possible four, eight, ten, and twelve weeks after treatment was begun. To determine the rate of disappearance of the substance, samples were also taken, usually two, four, and eight weeks, and if necessary at a later stage, after treatment.

BIOLOGICAL ASSAY

The extract of pregnant mares' serum used in all the biological assays was the same as that employed in the production of the antisera. The extract was assayed for gonadotrophic activity by its ability to increase the weight of the ovaries of the immature rat. Groups of ten to twenty rats weighing 40 to 50 grammes were injected subcutaneously once daily for five days with different amounts of extract. The animals were killed twenty-four hours after the last injection, and their ovaries and uterus dissected, fixed in Bouin's fluid overnight, and on the following day weighed from 70 per cent. alcohol. A dose/response curve was drawn from the results, which are given in Table I. The antigonadotrophic activity of the serum was assayed by its ability to inhibit this response to the gonadotrophic extract when injected simultaneously.

TABLE I.—*Gonadotrophic Activity of the Extract of Pregnant Mares' Serum*

Number of Rats per Group	Total Amount of Extract Injected (mg.)	Average Weight of Ovaries (mg.)
10	0	10
20	0.25	33
10	0.375	56
20	0.5	91
10	0.75	131
10	1.0	203

In all tests on the inhibitory activity of the sera a standard total amount of 0.5 mg. of extract was injected. Both serum and extract were injected into groups of five immature female rats once daily for five days; injections were made into opposite flanks of each animal. The ovaries were weighed as described above. The antigonadotrophic activity of the serum was determined as follows:

An amount of serum was injected which was estimated to cause a partial reduction in the response (weight) of the ovaries to the standard amount of extract. From the dose/response curve the amount of extract was calculated which, given alone, was required to produce the same ovarian weight as that resulting from the combined injection. The difference between this calculated amount and 0.5 mg. would therefore represent the amount of extract inhibited by the quantity of serum injected into the test rat. The results are expressed throughout as the number of milligrammes inhibited by 1 c.cm. of serum.

Results

The Development of Antigonadotrophic Activity.—The results obtained are shown graphically in Figs. 1–3. No

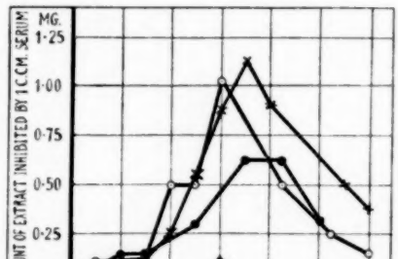

FIG. 1.—Antigonadotrophic activity of the serum of three patients injected daily with extract of pregnant mares' serum. × = patient No. 32, injected with 6 mg.; ● = patient No. 19, injected with 12 mg.; ⊙ = patient No. 18, injected with 13.5 mg.
The arrow in each figure indicates the time when treatment was stopped.

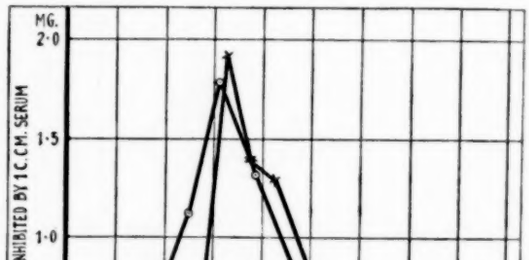

FIG. 2.—Antigonadotrophic activity of serum of three patients injected bi-weekly with 18 mg. of extract. × = No. 24; ● = No. 25; ⊙ = No. 26.

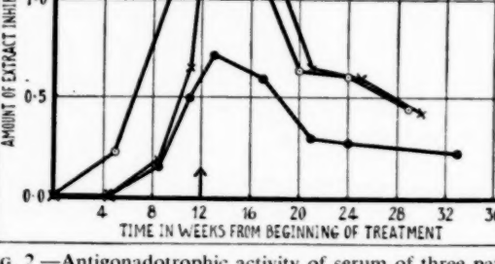

FIG. 3.—Antigonadotrophic activity of serum of three patients injected bi-weekly with 36 mg. of extract. × = No. 22; ● = No. 23; ⊙ = No. 27.

antigonadotrophic activity could be detected in the serum of any of the patients before treatment began. After about six weeks' treatment, whether by daily or by twice-weekly injection, the serum of most of the patients contained some antigonadotrophic activity, which, on the whole, rapidly increased throughout the remainder of treatment. In most patients little, if any, increase in the activity occurred after the treatment was stopped. However, the activity of the serum of two patients (Nos. 22 and 27) injected with 36 mg. twice weekly continued to rise for another four weeks. One week after the end of treatment 1 c.cm. of each serum neutralized 1.8 and 1.35 mg. of extract respectively, whereas three weeks later the same amount of serum inhibited 3.3 and 2.85 mg. respectively. The total volume of serum being assumed to be 1.5 litres, it can be calculated that about 4.5 grammes of the extract would be neutralized completely by the total antigonadotrophic activity in the blood of each of these patients. Each patient had received only 0.864 gramme of extract. The antigonadotrophic substance in the circulation alone at the end of the course was therefore enough to neutralize more than five times the total quantity injected. After reaching its maximum the activity diminished, at first rapidly, but subsequently more gradually, so that in most cases it was still demonstrable three months or more after treatment was terminated.

Specificity of the Action of the Serum.—Some antigonadotrophic sera, in addition to inhibiting the action of the extracts used in their production, can also inhibit the action of gonadotrophic extracts prepared from other sources. A number of cross-reactions between various extracts and their antisera carried out by Rowlands (1938) showed that an antiserum prepared in rabbits to an extract of pregnant mares' serum was highly specific in that it inhibited only extracts prepared from this source. This specificity was also observed in the present experiments. Thus the serum of patient No. 18, at the time when it contained its maximum antigonadotrophic activity, did not neutralize the action of extracts of human pituitary tissue or human urine of pregnancy. The results are summarized in Table II, which shows that the simultaneous administration of the antiserum did not reduce the response of the ovaries of rats injected with the extracts of human origin. It is concluded, therefore, that the antigonadotrophic substance present in the blood of patients treated with extracts of pregnant mares' serum would not inhibit the gonadotrophic hormone secreted by the patients' own pituitary glands, nor is it likely to inhibit the action of gonadotrophic extracts prepared from other sources. Some proof of this was obtained clinically.

TABLE II.—*The Effect of Antiserum to Extract of Pregnant Mares' Serum on the Gonadotrophic Activity of the Human Pituitary Gland and on that of the Urine of Pregnant Women*

Extract Given	Total Amount of Extract Injected (mg.)	Serum Given	Total Amount of Serum Injected (c.cm.)	Average Weight of Ovaries (mg.)
Human pituitary gland (AP 47)	2	—	—	40
" " "	2	No. 18	1	42
Urine of pregnancy (UP 10)	1	—	—	30
" " "	1	No. 18	1	30

Clinical Effect of Extract of Pregnant Mares' Serum.—In none of the patients was any improvement in the position of their testes observed at the end of twelve weeks' treatment. This might be due to an inherent ineffectiveness of this type of gonadotrophic extract for this condition, but it seems much more probable that it is the result of the development of refractoriness. If this were so, then the extract which was injected would almost certainly be neutralized in the blood of the patient, thus rendering it ineffective. Three months after treatment with extract of pregnant mares' serum was discontinued, treatment with bi-weekly injections of gonadotrophic extract of human urine of pregnancy ("pregnyl") was instituted. As the majority of the patients have only just begun this form of therapy a full description must be deferred. It may be mentioned, however, that of three patients (Nos. 18, 19, and 23) who have received the full course of treatment with the urinary extract, two (Nos. 18 and 19) responded favourably, a successful result being obtained after two and four months respectively. Three other patients with undescended testes, whose blood was not assayed for antigonadotrophic activity, were treated with extract of pregnant mares' serum for twelve weeks, two patients receiving 18 mg. and one 12 mg. intramuscularly twice weekly. At the end of treatment no improvement was observed. They were then treated with extract of human urine of pregnancy without any intervening rest period between the two forms of therapy. A successful result was obtained in one patient after two and a half months.

Thus three patients who did not respond to extract of pregnant mares' serum responded subsequently to extract of human urine of pregnancy, in spite of the presence in their blood of a substance inhibitory to the former extract. This, therefore, is a further demonstration of the specificity of the antigonadotrophic substance produced by extract of pregnant mares' serum, and, although the number of cases so far is small, it suggests that extract of human urine of pregnancy is more effective than extract of pregnant mares' serum in treating this condition.

Discussion

The data recorded above provide information on two points—(*a*) the relation between amount and method of dosage and degree of antigonadotrophic activity evoked, and (*b*) the rate of disappearance of this inhibitory activity after the end of treatment. It appears that the degree of antigonadotrophic activity is not proportional to the amount of extract injected. The activity of the serum of the patients treated with bi-weekly injections was nearly twice as great as that of the patients given daily injections, although the latter received the same or even greater total amounts. Moreover, the activity of the serum of patient No. 32, who was injected daily with 6 mg. of extract, was as great as that of either of the other patients injected daily with 12 and 13.5 mg. respectively. The method of bi-weekly injections appears to be more conducive to the formation of inhibitory sera, as shown by the fact that the activity of the serum of two of the patients injected with 18 mg. of extract twice weekly was greater than that of the serum of the patients injected with 13.5 mg. daily—two and a half times the total weekly amount.

The intensification of antigonadotrophic activity after the treatment had been discontinued, such as was observed in two of the three patients who received the larger bi-weekly injection, is unusual in our experience. It is difficult to explain why it should have occurred in these patients and not in Nos. 18 and 19, who were injected with an even greater weekly amount of extract. Until further confirmation of this is forthcoming it would be premature to discuss the significance of this finding.

Summary

Antigonadotrophic activity was demonstrable in the serum of nine patients with undescended testes who were injected intramuscularly, either daily or twice weekly, for twelve weeks with an extract of the serum of pregnant mares.

The antigonadotrophic activity (*a*) developed after four to six weeks' treatment, and subsequently in most cases rose rapidly; (*b*) was not proportional to the amount of extract which was injected; (*c*) usually decreased at the end of treatment, but was still present for three months or more—in two patients, however, activity increased for about three weeks after injections were discontinued; (*d*) was greater in patients who received twice-weekly injections of extract.

The previous observation of Rowlands (1938) on the specificity of a similar antiserum, raised in rabbits, was confirmed. The human antiserum did not inhibit, in immature rats, the action of extracts of either human pituitary gland or urine of pregnancy.

No improvement in the position of the testes of the patients was observed during treatment with this extract, but in three of six patients subsequently treated with extract of urine of pregnancy descent of the testes was successfully obtained.

We desire to thank Dr. A. N. Macbeth of N.V. Organon for supplies of the extract of pregnant mares' serum and extract of human urine of pregnancy ("pregnyl").

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BRONCHOGRAPHY*

BY

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Bronchoscopy has its limitations. For example, the upper lobe bronchus, except for a very small portion at its mouth, cannot be explored, and the lesser bronchi of the middle and lower lobes are too narrow to permit the passage of a bronchoscope. As pulmonary disease frequently affects just those parts which are invisible, how can this difficulty be overcome? Bronchography will, to some extent, provide a remedy. By the injection of radio-opaque oil the whole bronchial tree can be demonstrated with little or no distortion on the fluoroscopic screen. The projection of a mere shadow cannot, of course, have the accuracy of direct vision, but it is an excellent substitute. Originally it was for therapeutic reasons that lipiodol was injected into the lung by Lafay (1901). Twenty-one years later it was advocated as a contrast medium by Sicard and Forestier (1922).

Clinical Application

The importance of bronchography has developed with the advance of thoracic surgery. In bronchiectasis the smaller bronchioles beyond bronchoscopic vision are principally affected, and great scope is therefore provided for bronchography. It is upon the injection of radio-opaque oil that we must rely for confirmation of the diagnosis and for the determination of the extent of the lesion.

Neoplasms also afford a considerable field for bronchography, especially as there may be no endoscopic signs when the smaller bronchi are invaded. Now these are the cases most suitable for operation. A bronchogram demonstrating blockage of a bronchiole, taken in conjunction with clinical and other radiological signs, will make diagnosis of neoplasm possible at a stage when lobectomy holds out a good prospect of success. Investigation of an obscure shadow seen in the radiological examination of the chest may call for the determination of its relation to the bronchial tree on the one hand and the mediastinum on the other. Here a bronchogram is most helpful, particularly if bronchoscopy has been negative.

Interpretation

Nowadays lobectomy is being more frequently performed for the treatment of bronchiectasis, and the accurate interpretation of a well-taken bronchogram is essential for the success of the thoracic surgeon. In bronchiectasis the ideal case for lobectomy would be one confined to a lower lobe, and it is as well to point out here that lobectomy will fail in such a case if cavitation of the lingula has escaped recognition. Bronchography alone will avert this and enable the surgeon to deal with the lower lobe and the lingula at the same time. To investigate a case completely a series of bronchograms of both lungs is essential.

It must be realized that in the antero-posterior film the upper lobe overlaps the greater part of the lower lobe, and it may be impossible to determine whether a dilated bronchus lies in the upper, middle, or lower lobe. A lateral film is therefore a *sine qua non*, and only one lung must be delineated, otherwise the bronchial shadows of the opposite side will obscure the view. Stereoscopic pictures are difficult to obtain and have not proved of the same value in bronchography as in ordinary chest photography.

Technique

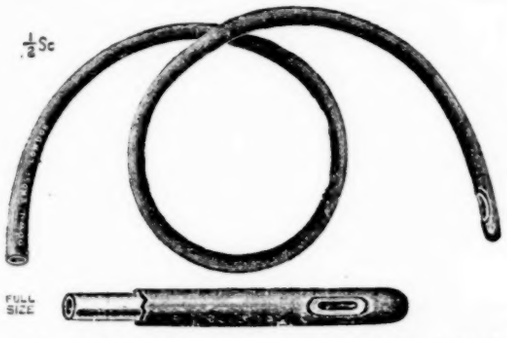
To satisfy the requirements of the surgeon the injection of radio-opaque oil must be confined to one lung, or even one lobe of a lung. There is a choice of two methods: the oil may be injected under direct vision through a bronchoscope or through a catheter inserted into the bronchial stem under fluoroscopic guidance. The bronchoscopic method has been extensively used but has drawbacks, as pointed out by C. L. Jackson and Bonnier (1937) of Philadelphia. I will quote their words: "Too much of the lipiodol was coughed out, especially in children; and often there was some delay in transportation of the patient to the *x*-ray department or in taking the picture." The instillation of lipiodol by means of a catheter passed into the trachea was first described by Iglauer (1926), and modifications of the method have been in use ever since. By this means radio-opaque oil can be delivered into any part of the bronchial tree under fluoroscopic control. The manipulation is simple and is free from danger. Attention to detail is, however, essential to success.

In adults the pharynx and larynx are anaesthetized with 10 per cent. cocaine or one of its substitutes. My preference is for 2 per cent. decicaine (pantocaine), which produces sufficient anaesthesia and is less toxic. A fine spray is used for the pharynx, and for the glottis either a laryngeal spray or the fractional instillation of Luken, which has the advantage of anaesthetizing the trachea and thus inhibiting the cough reflex. A soft rubber catheter

* Read in opening a discussion in the Section of Oto-rhino-laryngology at the Annual Meeting of the British Medical Association, Aberdeen, 1939.

(16 F gauge) is threaded on a curved stylet. The tip is passed through the glottis by indirect laryngoscopy. With the stylet *in situ* the catheter is slipped forward until some three inches have entered the trachea. The stylet is then withdrawn, and the catheter advanced till only the proximal two inches project from the mouth. At this stage there is generally some coughing, which soon subsides, but if it persists a little local anaesthetic should be injected through the catheter. This will prevent recurrence of cough when the oil is injected. The upper end of the catheter should now be anchored to the cheek with adhesive strapping and the patient transferred to the *x*-ray department.

I have found that the use of a catheter with a malleable radio-opaque tip is a great advantage in directing it by fluoroscopic guidance into the lobe chosen. Such a catheter was made for me by Messrs. Down Bros. (See Fig.) It consists of an ordinary rubber catheter into the distal two inches of which is inserted a fine lead tube with a hole corresponding to the eye of the catheter. This is very malleable and is readily detected on the fluoroscopic



screen. A slight bend at the tip facilitates introduction into the selected bronchus. The technique of introduction is the same. I have found no contraindication to its use in adults.

In children the method must be modified owing to the difficulties of indirect laryngoscopy and to the risks of local anaesthesia. It is generally easy to pass a catheter through the nose to the larynx and trachea, introduction being facilitated by extension of the head and flexion of the neck. If this route is chosen the lead-tipped catheter cannot be used.

Bronchography is rarely called for in children under the age of 5, but if it has to be carried out it is better to pass the catheter by direct laryngoscopy.

The positioning of the catheter and the oil injection are controlled by fluoroscopy: 5 to 10 c.cm. will delineate a lobe; 15 to 20 c.cm. is required to outline an entire lung. The position of the patient will vary with the lobe to be dealt with. The erect posture is the most suitable for the lower and middle lobes, and for the upper lobe the patient lies on the back with the opposite shoulder raised. To exclude cavitation of the lingula the anterior part of the upper lobe has to be filled, and the patient should be rolled slightly over on the face.

The film should be made immediately after the lobe has been filled, as even one cough may so spread the oil that definition of the bronchial tree is impaired. For this reason it is advisable to make the exposure on the screening stand. Some loss of accuracy results, but compensation is found in a higher percentage of successes. If coughing has been avoided the patient can then be taken to the usual photographic unit and a second exposure made. The catheter should be left *in situ* till all necessary films have been taken. The depth of exposure is of great importance. The standard exposure is too short to provide the necessary contrast, particularly if the lesion lies behind the cardiac shadow or below the dome of the diaphragm. Increase is obtained by doubling the penetration, and, if necessary, the time also. By this method lesions have been demonstrated which were not visible in plates taken with the usual exposure. Two weeks should elapse before a second bronchogram is taken, so as to allow the lipiodol to be eliminated.

Conclusions

Bronchography is not a substitute for bronchoscopy; it is an adjuvant.

In most cases bronchoscopy should precede bronchography, but in some patients it may be advantageous to reverse the order. In young or nervous subjects, for example, the manipulations of bronchography will prepare them for the more trying ordeal of bronchoscopy.

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CRATAEGUS OXYACANTHA IN HYPERTENSION

BY

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Crude extracts of hawthorn (*Crataegus oxyacantha*) have been used as a curative agent for cardiac disease, hypertension, and morbid conditions of the chest since the Middle Ages. The claims of the few who advocate the use of crataegus in such conditions have never been satisfactorily tested. The drug was introduced to medicine in Britain about 1880 by Green, a non-registered practitioner in Ireland. Subsequently it was adopted by the homoeopathic school and incorporated in their authoritative works (Assmann, 1930). In America, Jennings (1906) advocated the use of tincture of crataegus as an adjuvant to and even a substitute for digitalis in the treatment of cardiac disease, while Reilly (1910) recommended its use in cases of cardiac failure with arteriosclerosis and high blood pressure. In France it has long had a certain vogue, and Huchard (1903), Leclerc (1912), and Renon (1915) recommend the use of five minims of the tincture of hawthorn twice daily in order to keep the blood pressure of cases of hypertension within reasonable bounds.

Pharmacology

A series of investigations into the pharmacology of *Crataegus oxyacantha* was undertaken; they may be summarized as follows:

Tincture of crataegus causes sterile abscesses in guinea-pigs into which it is injected subcutaneously. Intravenous infusion of dilutions of the tincture from which the alcohol has been removed increases the gastric motility in anaesthetized guinea-pigs. The motor gradient of the isolated bowel of rabbits is reversed. In mammals intravenous infusion of similar dilutions of the tincture leads to slowing of the heart-beat, prolongation of the diastole with a tendency to idio-ventricular rhythm, and heart-block. The vagal centre in the

medulla is stimulated, the early effects on the heart being inhibited by atropine. The isolated mammalian heart exhibits interference with the conducting system, while the avian heart reacts in a similar way to the mammalian heart. The coronary arteries of the sheep and rabbit and the pulmonary arteries and bronchi in the guinea-pig are constricted by crataegus. The carotid blood pressure of cats anaesthetized with 0.5 grain of nembutal per kilogramme of weight is profoundly depressed by 0.5 c.cm. of non-alcoholic tincture of crataegus per kilogramme of weight. This effect is unaltered by atropinization of the animal, and agrees with the findings of Martini (1932) on the blood pressure of dogs. Subcutaneous injection of tincture of crataegus has an antidiuretic effect on rats. The tincture is toxic to the liver of mammals if repeatedly administered subcutaneously, but does not induce morphological changes in the heart.

It is interesting to note the considerable similarities between the actions of tincture of crataegus and tincture of digitalis.

Pharmacy

A large volume of the tincture of *Crataegus oxyacantha* was made by macerating two kilogrammes of dry powdered whole fruits of hawthorn with 5 litres of 70 per cent. alcohol for seven days, with occasional stirrings, filtering, pressing the marc, and mixing the fluids.

This was assayed against international standard (1926) tincture of digitalis prepared from samples of leaf provided by the National Institute for Medical Research, Hampstead. Biological assay was carried out by the frog and the cat methods on tincture of crataegus from which the alcohol had been removed by maintaining a temperature of 50° C. until the volume was reduced to 20 per cent. of the original volume. The average result of these investigations was that tincture of crataegus has a potency of 14.5 per cent. of standard (1926) tincture of digitalis.

Therapeutics

With the knowledge obtained from the investigations into the pharmacology of *Crataegus oxyacantha* clinical trial of the efficacy of the tincture in cases of cardiac failure and cases of hypertension was begun. Tincture of crataegus is unpleasant to take in large quantities, but does not cause vomiting. It is rejected by the rectum even when given in considerable dilution.

Auricular Fibrillation and Cardiac Failure

In two cases of auricular fibrillation and two of mitral stenosis with orthopnoea, oedema, and tachycardia, massive dosage with tincture of crataegus was employed. Half an ounce of tincture of crataegus was administered six-hourly up to a total amount of twenty ounces in ten days. There was no improvement in the cardiac condition, and oedema advanced steadily. The drug was therefore abandoned as a competitor of digitalis, administration of which rapidly led to improvement in these same patients. The blood pressure of these cases was not affected by the treatment with crataegus.

Hypertension

A series of ten cases of men and women with high blood pressure was chosen. These were in part cases of arteriosclerosis of unknown origin, in part cases of chronic nephritis. All had old-standing hemiplegic lesions and several suffered from mild dementia. The blood pressure in the unaffected arm was recorded daily by the one observer using the same instrument. Only those cases which had been shown to have a stable blood pressure over several weeks were chosen for intensive investigation, and the blood pressure was registered daily for ten consecutive days to establish a basic or normal level for each case. Tincture of crataegus, 1 drachm three times daily in water, was then administered by mouth. The daily readings of the pressure were charted, and the drug was discontinued when it was felt that the pressure had been reduced enough. No ill effects were complained of by any of the patients as a result of this administration. In every case the systolic and diastolic pressure was reduced, often sharply, and returned to its former level some fourteen days after stopping medication. No other treatment was given, the patients being at rest in bed on a light diet. The results of the treatment with tincture of crataegus are summarized in the table and illustrated in the diagram.

Table showing the Effect of Tincture of Crataegus on the Blood Pressure in Ten Cases of Hypertension

Case No.	Age in yrs.	Diagnosis	Systolic B.P.		Diastolic B.P.		Time to Return to Initial Value (Days)
			Initial	During Crataegus Therapy	Initial	During Crataegus Therapy	
1	82	Cerebral haem.	190	150	105	90	10
2	71	,,	195	150	115	80	14
3	84	Arterio-sclerosis	210	150	120	90	14
4	76	,,	200	140	110	80	14
5	67	Cerebral thrombosis	200	150	100	85	12
6	65	Cerebral haem.	240	165	120	90	16
7	66	Chronic nephritis	200	175	115	100	10
8	63	,,	215	160	150	90	17
9	75	,,	195	110	110	70	6
10	68	,,	200	150	70	55	(death) 14

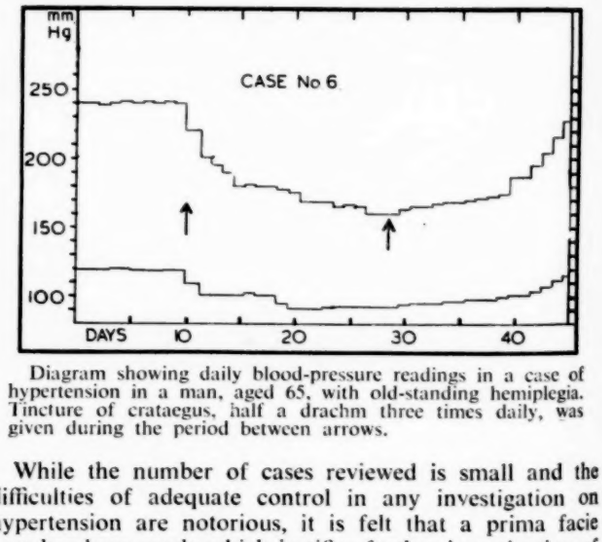

Diagram showing daily blood-pressure readings in a case of hypertension in a man, aged 65, with old-standing hemiplegia. Tincture of crataegus, half a drachm three times daily, was given during the period between arrows.

While the number of cases reviewed is small and the difficulties of adequate control in any investigation on hypertension are notorious, it is felt that a prima facie case has been made which justifies further investigation of tincture of crataegus as a depressor of the elevated blood pressure. In therapeutic doses digitalis produces slowing of the heart, promotes diuresis, and rapidly removes oedema of cardiac origin. The blood pressure in patients so treated is not affected, nor is it appreciably affected in cases of hypertension. Tincture of crataegus, on the other hand, has but little effect in slowing the heart rate, and diuresis is not induced by it. It, however, reduces elevated blood pressures, though large quantities may be taken with but little effect on the normal blood pressure. It is noteworthy that there is no sign of cumulative action, and that after cessation of the drug the blood pressure returns to its previous level.

Summary

The published work on *Crataegus oxyacantha* is briefly reviewed.

The pharmacology of crataegus is summarized and its resemblance in action to digitalis discussed.

The effect of tincture of crataegus in massive doses on cardiac failure, if there is any, is slight.

Ten cases of hypertension are reviewed and the result of treatment with 1 drachm of tincture of crataegus three times daily is shown to be that of a uniform lowering of the systolic and diastolic blood pressure.

This work was carried out with the aid of a grant from the Medical Research Council. Grateful acknowledgments are due to Professors E. P. Cathcart and N. Morris of the Departments of Physiology and Materia Medica for help and advice.

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Clinical Memoranda

Treatment of Pneumonia in Children with Sulphapyridine and Vaccines

Recent evidence (experimental, not clinical) indicates that in pneumonia treatment by sulphapyridine (M & B 693) is enhanced by vaccines, because it was found that the resulting antibodies were bactericidal while the drug was merely bacteriostatic (Maclean, Rogers, and Fleming, 1939; Fleming, 1939).

Clinical Evidence

I now submit the clinical evidence of combined sulphapyridine and vaccine treatment in fifty-two cases of pneumonia (lobar and lobular) under Dr. F. C. Eve at the Victoria Children's Hospital, Hull, during the first half of this year. These were all children between the ages of 1 and 12 years. The results have been remarkably good, as indicated by the reduction of oxygen treatment almost to *nil*. In all cases the temperature fell within three days and remained down, except in the case of one patient to whom the full dose of sulphapyridine had not been given. Sequels arose in only two cases. In one there was an empyema in an infant aged 2 years, which was due to pneumococci only; this disappeared without operation after one small aspiration (clear, according to *x*-ray examination, after six weeks). In the other case spontaneous pneumothorax occurred twice in a child aged 4 years, with complete recovery.

The average stay in hospital of these fifty-two cases was ten days and there were no deaths, whereas in the corresponding six months of 1938 ten cases of pneumonia were treated, with one death and an average stay in hospital of 16.6 days. In 1937 eleven cases were treated, with one death and an average stay in hospital of 18 days. In 1937 and 1938 vaccine treatment alone was given.

Regardless of the age of the child Wynn's vaccine was given as follows: 1/3 c.cm. on the first day; 2/3 c.cm. on the second day; 1 c.cm. on the third day. Sulphapyridine was administered in the following doses, four-hourly, and was stopped after three days' absence of fever: ¼ tablet under 6 months; ½ tablet under 2 years; ¾ tablet under 5 years; 1 tablet under 12 years.

Clear cases of bronchitis were not thus treated, but in children it is often impossible to be sure of a diagnosis on admission, and it was felt safer to treat all cases thought to be of pneumonia rather than to wait and see. In this series there was no evidence of any harmful effects from sulphapyridine except in two cases in which mild vomiting occurred, which stopped on omission of the drug, and one mild rash, which also subsided quickly.

In conclusion, our impression of sulphapyridine used in combination with Wynn's vaccine is that (1) the pneumonia is shortened; (2) the drug is entirely harmless; (3) the death rate is probably reduced; (4) it is necessary to give full doses of sulphapyridine.

My thanks are due to Dr. F. C. Eve for suggesting the publication of these cases.

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A Wound of the Left Common Carotid Artery

The following case seems interesting enough to be placed on record.

An engineer aged 26 was admitted to the Willesden General Hospital on the afternoon of July 30, 1939, about twenty minutes after an accident sustained while at work. It is understood that a workmate, being of an inquiring disposition, had screwed up a boxful of phosphorus match heads in a vice, thereby producing an interesting explosion. The explosion, however, was considerably more violent than expected: a small piece of steel was projected some yards and struck the patient violently on the left side of the neck, causing him to fall unconscious. He soon recovered consciousness, and was given first-aid treatment and then removed to hospital. It is stated that there was profuse arterial bleeding.

Condition on Admission

On admission the patient was grey and shocked, and arterial blood was spurting from a small punctured wound over the left sterno-mastoid muscle at the level of the hyoid bone. The casualty officer, Mr. Campbell, suspected a wound of one of the major vessels, and while waiting for me applied a firm pad and bandage. When I saw the man a few minutes later he was complaining of a tight feeling in his neck and a difficulty in breathing. I removed the bandage and found that the external haemorrhage had ceased; but his symptoms continued, and it became obvious that the dyspnoea was due not to the tight bandage but to marked displacement of the larynx to the opposite side of the neck. The history and physical signs certainly suggested that the carotid artery had been punctured, and although it appeared that haemorrhage had ceased there remained a definite possibility that this might recur either when the blood pressure rose to normal or when some sudden movement was made. I concluded, therefore, that immediate exploration was the safest procedure.

Operation

One hour after admission operation was performed under gas-and-oxygen anaesthesia preceded by intravenous pentothal sodium. The skin edges of the wound were excised and the wound enlarged. An ill-defined track passing vertically through the sterno-mastoid muscle was visible and was very gently palpated for the presence of a metallic foreign body. The result of this manœuvre was a sudden and furious arterial haemorrhage, so severe as to indicate that either the common carotid artery or one of the main terminal branches was involved. Direct pressure through the sterno-mastoid by means

of a gauze pad and two fingers gave complete control of bleeding, and while this control was kept up it was decided to try the effect of temporary ligation of the common carotid artery.

The wound was extended to the base of the neck, and the artery exposed and isolated with some difficulty owing to the presence of blood and clot both in the deeper planes of the neck and in the muscular belly of the sterno-mastoid muscle; occlusion of the vessel was accomplished and the pressure at the site of the haemorrhage was then released, with the result that haemorrhage restarted as furiously as ever. The wound was then extended up to the tip of the mastoid process, but dissection was greatly impeded owing to difficulty of access caused by the presence of the pressure pad and fingers of my assistant at the site of the original wound. Eventually this pressure had to be released while rapid dissection and swabbing enabled me to expose the bifurcation of the common carotid artery, which was the situation of the arterial wound. This was seized with a pair of artery forceps, and the common, external, and internal carotid arteries were ligatured. The wound was then closed with drainage and a blood transfusion was administered. This resulted in immediate improvement in the man's general condition, which had become rather poor towards the end of the operation.

No abnormal symptoms and signs were evident during convalescence except for a very severe occipital headache, which lasted from the fifth to the tenth day after operation, and the man was discharged from hospital on the fourteenth day.

COMMENTARY

The recurrence of severe haemorrhage at the time of operation, when only the very gentlest palpation was used, shows to what risks the man would have been subjected if a policy of wait and see had been conceived. My decision to operate, so amply justified in the end, was not taken without some hesitancy, as it seemed possible that direct pressure by a firm pad might have sufficed, although perhaps with the ultimate dangers of embolism and aneurysm. It is worthy of note, too, that at the time of operation quite gentle pressure through the sterno-mastoid against the transverse processes of the cervical spine was enough to control haemorrhage. It was also instructive to find that temporary occlusion of the common carotid artery was so completely ineffective in this case, the possible explanation being that the arterial anastomosis in young adults is very free. Temporary occlusion of the common carotid has been reported on as being very effective, so that the lack of control on this occasion was most disappointing and added greatly to our own difficulties and to the danger to the patient.

One has been taught that ligation of the common carotid artery is an operation particularly apt to be followed by hemiplegia. The hemiplegia is thought to be caused either by an immediate cerebral anaemia or by the effect of embolism. The latter hypothesis is said to be more probable because the onset of cerebral symptoms is often delayed until between the fifth and eighth days following operation, when, it is suggested, a portion of clot is washed up the internal carotid by back flow from the external carotid, the latent period having covered the establishment of an effective collateral circulation through the branches of the external carotid and the gradual extension of thrombosis from the site of ligation to the bifurcation of the common carotid.

In the case described this cycle of events obviously could not occur, as the three major vessels were ligated simultaneously, but it is interesting to note that the unexplained and severe occipital headache, while probably only a coincidence, did not become evident until the fifth day.

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Surgeon to the Willesden General Hospital.

Reviews

A FRENCH SYSTEM OF OPHTHALMOLOGY

Traité d'Ophtalmologie. Edited by P. Bailliart, C. Coutela, E. Redslob, and E. Velter. Volumes I and II. (Volume I, pp. 1,042; 755 figures; 7 plates. Volume II, pp. 1,144; 692 figures; 5 plates.) Paris: Masson et Cie. 1939.

French ophthalmology has a great tradition. During the eighteenth century it laid the basis of modern clinical practice, a brilliant galaxy of clinicians like Brisseau, de la Hire, Maître Jan, Saint-Yves, Daviel, and many others building solidly on the new anatomy and physiology that had developed in the seventeenth century following the break with Galen that the Renaissance had brought about. The dominating position of French ophthalmology can be seen from the fact that both the recognition of the nature of cataract as an opacity of the lens, and not as an effusion in front of it, and the radical treatment by extraction that is still practised to-day, were developed in France. In fact, a new pathology of ocular disease was created by this work, for it made untenable the fallacious theories concerning other lesions. In the succeeding century ophthalmology developed greatly in other centres, so that while French supremacy was no longer maintained the ophthalmology of France has always occupied an honoured and prominent position. The present system of ophthalmology, published under the auspices of the French Ophthalmological Society, is planned to run to eight volumes, and judging by the first two the effort is worthy of the great tradition behind it. The editors of the system have not confined themselves exclusively to French contributors, for a few of the hundred or so writers come from adjacent French-speaking countries like Belgium and Switzerland.

The first volume is devoted to the history of ophthalmology, the human and comparative anatomy of the eye and its adnexa, their embryology and teratology. There is also a chapter on heredity in ophthalmology. In the opening chapter, on the history of ophthalmology, Professor Villard covers this big field in a manner both concise and interesting; the information is up to date. The twelve chapters on the anatomical aspects of the eye and its adnexa cover eight hundred pages and constitute a really superb treatise, different aspects being dealt with authoritatively by different contributors. Special reference must be made to Dr. Rochon-Duvigneaud's comprehensive contribution to the comparative anatomy and physiology of the eye. This is a subject to which the author has contributed extensively, and his review leaves nothing to be desired in the way of completeness or clarity. The two concluding chapters, on heredity and teratology, by Professor Van Duyse, though excellent in themselves, do not quite maintain the high standard of the rest of this volume, for much recent work has been overlooked.

The second volume is devoted to the physiology and methods of examination of the eye. The fifteen chapters on physiology show the same modernity as the first volume—a not inconsiderable achievement in view of the rapidly changing character of this particular study. Thus in addition to the more established knowledge of physical and physiological optics there is the excellent account by Professor G. Leplat of the biological action of radiant energy on the eye. The twelve chapters on methods of examination cover fully the standard techniques and contain such newer developments as the measurement of

the pressure in the retinal arteries and the photography of the eye. It would be a thankless and futile task to point out minor omissions in a work of this character. It is more gratifying to see a book of this type worthily produced—a feature in which French publications are sometimes apt to fail.

SURGICAL PATHOLOGY OF THE SPLEEN

Pathologie Chirurgicale de la Ratê. By Pierre Goinard. (Pp. 174; 4 figures; 11 plates. 55 francs.) Paris: Masson et Cie. 1939.

In 1867 Péan, under the mistaken impression that he was operating for an ovarian cyst, successfully removed a cystic spleen. The author of this monograph tells us that this was the first authentic successful splenectomy, since when it was realized that an apparently normal life could be lived without the spleen. Various operations such as splenopexy and splenorrhaphy have been performed, but to-day the surgery of the spleen may be said to be almost synonymous with splenectomy. Splenectomy has contributed largely to our knowledge of the morbid anatomy of the spleen, and Goinard believes that we have now reached a stage at which stocktaking is desirable and the results of and indications for splenectomy can be set forth. Too many splenectomies have been performed and are still being practised. In a well-arranged and attractive volume, printed in large clear type which is easily read and appropriately illustrated, the author summarizes present knowledge of those diseases of the spleen which have some surgical bearing. As an indication of the lesions considered we may refer to ptosis and torsion of the splenic pedicle, contusions and rupture, wounds and hernia, abscess, tumours, cysts, the various forms of splenomegaly, particularly those encountered in the Tropics and especially the Algerian enlargement, on which the author of this volume may be said to be an acknowledged authority, and the spleen in blood diseases such as acholuric jaundice and purpura haemorrhagica.

The greater part of the book will be of interest to the surgeon: distinctions between Gaucher's and Pick-Niemann disease are perhaps of more interest to physicians or pathologists, but their inclusion serves to make this monograph more complete. The penultimate chapter deals with surgical technique, while the final chapter briefly summarizes the conclusions of the review. With the introduction of radiotherapy for splenomegalic leukaemia, liver therapy for pernicious anaemia, and chemotherapy for kala-azar, and with our wider knowledge of what may be expected from splenectomy, the operation is nowadays less often indicated, and except for purely surgical lesions such as injuries should only be considered after careful discussion between physician and surgeon. In our opinion this monograph would be an admirable aid to such discussion.

UNCONSCIOUS CAUSES OF WAR

War and Peace. Essays in Psychological Analysis. By William Brown, M.D. (Pp. 93. 5s. net.) London: A. and C. Black. 1939.

Dr. William Brown's short book on *War and Peace* consists of lectures given at Oxford and some reprinted letters to the *Times*. The substance of them will be already familiar to those who have read his other books, but the language is simpler and less technical, as is necessary if the contents are to have a general appeal. It is perhaps in some respects already out of date because last April war did not appear to him or to many others as inevitable in the near future, and his arguments are partly based on that belief, while convinced that the latest war would not be the last. As is well known, he had wide experience during the last war of the psychology of the soldier both in the field and in hospital, which gives him an advantage over the arm-chair theorist. Here he applies the results of an analysis of the general primitive tendencies of self-preservation and aggressiveness in the individual to the like tendencies in the State. His conclusions are not very different from those reached by Dr. Edward Glover in his book *War, Sadism and Pacificism*, and both authors agree that the leaders of a nation should be aware of the mental forces at work below the surface. Starting with the postulate that war and even rumours of war release emotional and irrational forces which make for more primitive methods of thought, he shows, as Wilfred Trotter did in his small masterpiece *The Instincts of the Herd*, that under those conditions the people become highly dependent upon a leader and, forsaking all others, can only hear his voice. This of course is much more marked in a totalitarian than in a democratic State, which gives an initial advantage to the former as long as the leader can show results. Dr. William Brown goes on to point out in an interesting manner that under such conditions the Freudian super-ego of the individual is for the time being virtually transferred to the leader. We are familiar with the type of mind that is happiest when it can cast all responsibility on to someone else.

It is inevitable that the author's analysis of the unconscious causes of war is more convincing than his constructive policy of peace. His amusing comments on the pugnacity of pacifists helps to explain that. The book finishes appropriately enough with an appendix on paranoia! One is left with a sensation of the near presence of that grim *ἀνάγκη* of Greek tragedy and Hardy's *Dynasts*, "of the working of fundamental parts of the mind not under the full control of the conscious personality." Plautus might say, "In wondrous ways the gods make sport with men," but it is for us to learn where the blame should really be laid.

PATHOGENESIS OF PERIDIVERTICULITIS

Acta Pathologica et Microbiologica Scandinavica. Contribution to the Pathological Anatomy of the Complications following "Diverticulosis Coli"—with Special Regard to the Pathogenesis of "Peridiverticulitis." By Dr. Hans Thomsen. Volume XVI, fasc. 3. (Pp. 215–345; illustrated. 1 volume (generally 4 numbers) 35 Danish crowns.) Copenhagen: Einar Munksgaard. 1939.

Dr. Hans Thomsen of Juelsminde, Denmark, published in 1934 a brochure on the symptoms and clinical recognition of inflammation in the region of diverticula of the colon. In his contribution to the pathological anatomy of the complications of diverticulosis coli he distinguishes from the chronic adhesive perisigmoiditis the forms which are due to local abscess formation in the intestinal wall or mesentery occurring as inflammatory tumours or stenoses. L. B. Wilson, who first drew attention to the subject, regarded such inflammation that occurred in the fatty connective tissue surrounding the diverticulum without traceable alterations of the diverticular wall itself as due to diffusion of bacteria and their metabolic products through the wall. This explanation appears to have been accepted by other pathologists without comment, but Thomsen, in the study of six cases, sets out a different explanation which appears more natural and probable than that stated by Wilson. By careful serial section he found that the contents of these tiny abscesses were not only polymor-

phonuclear leucocytes, round cells, eosinophils, and blood, but fairly numerous giant cells were found at the edges, and in several places foreign bodies in the shape of long, somewhat twined threads of cellulose. The only explanation of this picture, in which acute and chronic processes are found, can be that these multiple foreign bodies have gradually perforated the thin walls of the diverticula and thus made their way outside the lumen of the bowel; here the organism has then tried to encyst them. In some instances the reparative processes may be so strong as to enclose the foreign body in an abundant new formation of connective tissue, or a single abscess round a foreign body may perhaps perforate to the intestinal lumen and so be evacuated.

Using the analogy of the giant cells found in anal fistulae, now recognized as giant cells of foreign bodies, Thomsen offers this explanation of the pathogenesis of the inflammatory tumours found with diverticulosis. There is thus a close relationship between the inflammatory tumour or peridiverticulitis and perforation of diverticula leading either to peritonitis or to fistula into bladder or to the surface skin. The demonstration of the causative foreign bodies—splinters of vegetable cellulose—is a laborious job involving cutting serial sections of strips of the bowel wall. The author points out that the tissue must be specially hardened to bring the viscus to a state of firmness about equal to that of the foreign bodies, otherwise the sections merely present a torn appearance and make the recognition of the foreign bodies, which are sometimes not very numerous, almost impossible. Dr. Thomsen's studies open up a new and interesting field in intestinal pathology.

PHYSICAL TRAINING FOR WOMEN

Sport, Physical Training and Womanhood. By Stephan K. Westmann, M.D., L.R.C.S., L.R.C.P., L.R.F.P.S. With a foreword by Sir Kaye Le Fleming, M.D. (Pp. 222; 73 figures. 12s. 6d.) London: Baillière, Tindall and Cox. 1939.

Formerly obstetrician and lecturer in the Berlin Postgraduate School, and holding the diploma of medical officer of sport, Dr. Westmann has experience on which to base his opinions. His thesis that the whole female organism takes its cue from the gradual rise and fall of uterine contractions is perhaps rather tenuous for the weight of deduction it is asked to support. If sudden overstrained muscular activity is disastrous for the female body, can it be argued that it is any more advantageous to the male? To envisage physical training for women solely as training for child-bearing is perhaps to narrow the issue too much; but there is great value in pointing out how wrong it is to make it merely a poor imitation of that suitable for men. This teaching is emphasized again in Sir Kaye Le Fleming's foreword.

Dr. Westmann begins by inveighing against competitive sport for women. If statistics are confessedly scanty, and deductions are influenced by personal conviction, the possible bad effects of professional or excessive athletics upon the pelvis, and upon the admired type of woman, are made clear. The different kinds of physical exercise, including games, are described at length, with interesting comments. Reference is also made to the effect of manual labour in industry. The anatomical and physiological considerations as reviewed are useful, provocative, and corrective to much current practice in physical training. There are sentences, however, of surprising inaccuracy. As the premier exercise suitable for women Dr. Westmann chooses swimming, but objects to diving. He fears the sudden shock of cold water; and jumping in any form seems to be anathema to him. There are unpleasing photographs of women athletes, and attractive ones of women training for the tremendous muscular effort of confinement, and doing restorative exercises graduated from the second day of the puerperium.

The aims of physical culture are set forth in a lively last chapter, from the Greeks to Botticelli and the Olympic Games of modern Europe. Dr. Westmann looks upon exercises as "a form of provocative therapy," and part of every doctor's equipment. He insists that there is an increasing number of women with small pelves, partly due to our down-grade civilization, so that it is doubly foolish to allow faulty training to develop the masculine type of woman, the dreaded virago. Moderation in all things is the penultimate word; the final is, "Woman does not merely become Mother; rather, to this end she was born."

Certain statistics in process of collection by the National Physical Fitness Council, and experiences of women athletes, weigh in against the alarmist attitude of Dr. Westmann. But no warning about the danger of competitive sport and excessive training can be disregarded, while positive teaching on the theory and right application of the various forms of physical training for women is very welcome.

Notes on Books

The Art of Mothercraft, Part II, by Dr. LESLIE HOUSDEN, is subtitled "The Study of Detail," and serves to apply the general principles laid down in the first volume of the series. The author writes attractively and accurately and, above all, with sound common sense. Parents and others interested in the care of the young will find it of much value. The section on bottle-feeding is rather inadequate, but this may be a deliberate effort to support the author's well-known enthusiasm for breast-feeding. The book is published at 1s. 6d. by the National Association of Maternity and Child Welfare Centres.

The fifth volume of *Traité de Biocolloïdologie*, by Dr. W. KOPACZEWSKI, is entitled "The Colloid State and Medicine." Half the volume deals with the blood and the remainder with tissue fluids, sweat, urine, and the body tissues. There is an abundance of tabulated material (255 tables), and in particular the author has collected data showing the chemical composition of fluids in different species. The chapter on the physical characteristics of the blood is noteworthy because the author has done much original work on this subject. The volume contains a large mass of information, and constitutes a very useful work of reference to the chemical and physical properties of the body fluids and tissues. It is published in Paris by Gautier-Villars at 100 fr.

Professor W. CATEL, with the help of seven collaborators, has produced a massive textbook on the nursing of healthy and sick children, *Die Pflege des gesunden und kranken Kindes, zugleich ein Lehrbuch der Ausbildung zur Säuglingspflegerin und Kinderkrankenschwester* (Leipzig: Georg Thieme). It is intended primarily for the nurse who is specializing in the nursing of children, but it is also intended to be of service to medical students and practitioners and to be a work of reference for mothers or students of mothercraft. It is a comprehensive work, containing long sections on normal function and structure, legal aspects, eugenic considerations, and racial matters, occupying nearly one-third of the book, before the actual details of nursing, management, and treatment of the healthy child are discussed. The remainder, just under half of the whole, is devoted to the care of the child in sickness. Concluding chapters deal with questions of diet, drug therapy, disinfection, physiotherapy, and with the prevention of accidents. Over four hundred illustra-

tions help to make plain matters of importance, and for the most part are well reproduced. Coloured plates of certain rashes are most successfully used. The book as a whole is well planned and the details appear to be well executed. Great care has been taken with sections, such as that on the occupation of the child (games, toys, and so forth), in which most children's nurses lack specific instruction.

Surface Anatomy, by Dr. W. E. ROBERTS of Sydney, Australia (Angus and Robertson, 7s. 6d.), consists of a series of plates which have been made from photograghs of the living model. The position of the underlying structures is clearly indicated on the surface, and the captions are arranged so that they appear either on the same page as the figure or opposite to it, and it is thus unnecessary to turn over pages in order to compare text with illustrations. The legends are patterns of brevity, pertinence, and exactitude, and the only criticism we feel tempted to make is of the likelihood of an impression being conveyed of an absolute constancy in position of the organs depicted beneath the surface, which is not warranted by the findings of recent researches on normal individuals by means of *x*-ray examinations. The relative positions of certain organs are, as is well known, altered by posture, and vary with the type-form of the individual age, and the distension or contraction of certain viscera during physiological action such as occurs during respiration, ingestion of food, or with the distension of the bladder and the loss of tonicity of the muscles of the abdominal wall. A few notes and radiographs indicating the extent and direction of some of these variations, while not greatly increasing the size of the book, would add much to its practical utility and surgical interest.

Preparations and Appliances

THE VEIN-SEEKER

A Simple Instrument for Entering Collapsed Veins

Mr. F. RONALD EDWARDS, M.D., Ch.M., F.R.C.S., writes from the Department of Surgery, University of Liverpool:

Experience with the use of bottles of stored blood, with their coincident delivery apparatuses, has shown that the entering of a collapsed vein in a shocked patient with a needle attached to a tube full of blood is on many occasions no simple matter. Numerous methods have been devised to overcome this difficulty, and of these the following are the most frequently used:

1. The needle may be removed from the end of the tube and attached to a Record syringe. When the vein has been found the syringe is removed and the tube reattached. This method is "messy," and with the manipuations to fix the tube back in position the needle may be pushed out of the vein or through its opposite wall.

2. The vein may be exposed and a cannula inserted. This method, although reliable, is time-consuming, and leads to the loss of that vein for any further intravenous work.

3. A Kaufmann's syringe may be attached to the end of the delivery tube, and this utilized for finding the vein. This is a very excellent method, but the syringe is rather expensive and easily broken. Under war-time conditions, where a large number of transfusions may be proceeding at the same time, hospitals may run short of a supply of these.

The following instrument, or "vein-seeker," is simple and cheap and any hospital may have an adequate supply by the expenditure of a few shillings.

The "vein-seeker" serves two purposes; first, it helps to find and enter a difficult vein, and, secondly, it in effect brings that vein upon the surface. It consists of four pieces: (1) A stainless steel needle of fine serum size cut down to 2.5 cm. length. (2) A piece of good-quality rubber tubing 3.5 cm. long and of 4 mm. bore. (3) A piece of glass tubing with flanged ends 4 cm. long and of 4 mm. bore. (4) A rubber teat which is slipped on the glass tubing over a second piece of rubber tubing a quarter of an inch long.

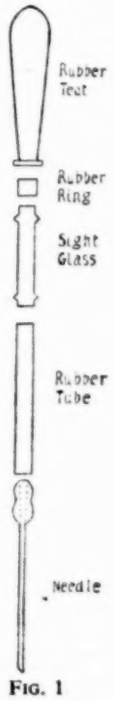

FIG. 1

The dissected instrument is shown in Fig. 1. Fig. 2 shows the apparatus in use.

METHOD OF USE

The whole is filled with 3.8 per cent. sodium citrate solution, and the instrument held with the hand in the supinated position. The length of the instrument from the butt of the needle to the teat is four inches, and this allows the butt of the needle to be held between the index and thumb, and the teat to be compressed by the fourth and fifth fingers against the hypothenar eminence.

The teat is now compressed to empty it of

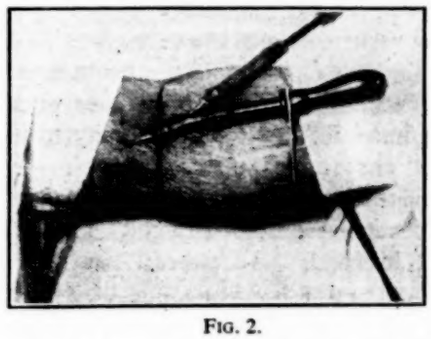

FIG. 2.

citrate solution, but leaving the rest of the instrument filled. The point of the needle is inserted under the skin where the vein is suspected to be, and the pressure on the teat released. The teat remains collapsed, for air will not enter the instrument owing to the point of the needle being buried in the subcuticular tissue. The vein is now sought with the point of the needle, and as soon as it is entered the negative pressure caused by the collapsed bulb will draw blood up into the instrument, and it can be seen in the glass tube. The whole is then fixed in position by two rubber bands (which are conveniently placed beforehand on the arm, one above and one below the elbow-joint) or by two pieces of thin strapping.

The needle leading from the bottle of blood is then inserted through the rubber tubing of the seeker and the transfusion proceeds. The flexible tube in the hollow of the elbow bends if the elbow is moved and the needle does not jump out of the vein. A second safety joint is also provided where the main needle from the bottle enters the rubber tube of the seeker. The transfusion may now be safely left, and if the patient is in any way restless a splint can be fixed to the back of the arm. Thus a number of transfusions can be carried out by one person at the same time.

If a second bottle of blood is necessary for the patient this can be put into circuit by pushing the delivery needle of this second bottle into the seeker's rubber tube. Saline or gum acacia saline can similarly be given after the transfusion by the same method. The rubber tube of the seeker thus acts as an external vein and can be used time and time again. An intravenous anaesthetic or a cardiac stimulant can be given by puncturing the rubber tube with the needle of the syringe. If for any reason the needle of the seeker becomes blocked, it can be cleared by pushing a stylet through the rubber tubing and down the needle without in any way disconnecting the apparatus.

This instrument is now standardized for use in the Merseyside War Blood Bank and is distributed with each delivery apparatus. It has been made by and is obtainable from Messrs. Evans Sons Lescher and Webb, 56, Hanover Street, Liverpool, 1.

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ANAESTHESIA IN WAR TIME

Organization of medical activity on a war-time basis has led to the ventilation of many problems, among them those with which anaesthetists are particularly concerned. In our correspondence columns there have been revealed surprising differences of opinion as to the best and safest methods to employ in order to ensure adequate anaesthetic services to the community. To the many practitioners who have a good working knowledge of the simple methods of anaesthesia but who have not had the opportunity to become familiar with the more modern anaesthetic agents and techniques it may well appear that much of the recent comment has obscured rather than clarified the problems in hand. Anaesthesia has seen great changes during the past few years, and the present situation has naturally become an opportunity for the airing of personal opinions upon the question of the most expedient type of anaesthesia. Individual anaesthetists have advocated their own favourite methods and have seen the chance of introducing these to wider use. Such publicity has its value in revealing developments in technique, but the wind of enthusiasm must be tempered. In some cases there has been an ill-founded prejudice for one or other method, and enough stress has not been laid on the necessity for due appreciation of the simple methods of anaesthesia. The advances that have been made have in no way diminished the importance of these methods, especially during war.

Anaesthesia will be conducted under a wider diversity of conditions during a war than in times of peace. In many of the base hospitals it will be possible to use modern equipment and the refinements of anaesthetic technique which have been developed in civilian life. The bulk of the anaesthetic work in these hospitals will be done by the specialist anaesthetist. In the less well equipped hospitals simplicity of technique will be all-important. In addition, many of the anaesthetists will be practitioners without a wide experience of anaesthesia and be suddenly called upon to do work of a scope far beyond their peace-time duties. It is essential that such men should employ methods with which they are familiar. The result of much of the recent correspondence will be to set many a conscientious practitioner wondering if he is rendering adequate service by using the methods he knows well. He can rest assured on this point. Although it is undoubtedly true that more recent anaesthetic agents and techniques have made induction of and recovery from anaesthesia more pleasant and have helped to reduce post-operative complications, ether is probably still the safest anaesthetic available. Open-drop ether might well be regarded as the standard method of anaesthesia, and competence in the administration of ether is of far more practical value than a smattering of experience of up-to-date agents. There is, however, one technique with which the practitioner should become familiar—that of endotracheal intubation. He should become familiar with the use of a laryngoscope. For cranial surgery and for plastic operations on the face and the neck endotracheal anaesthesia is essential, and for upper abdominal surgery it facilitates the maintenance of smooth uneventful anaesthesia.

It is reassuring to know that unlimited supplies of ether, ethyl chloride, and chloroform will continue to be available. With regard to drugs imported from foreign countries present stocks are estimated to be adequate for at least one year; there may not be so wide a choice of drugs in certain groups, but in time of war individual fads and fancies are of little consequence. There need be no fear that anaesthetic services will suffer from lack of indispensable supplies. Nitrous oxide and oxygen will continue to be available in unlimited amounts. It is essential, however, that containers for these gases should circulate freely, since a shortage of containers is the only factor which might lead to any difficulty in maintaining supplies. Hospitals should therefore refrain from storing more cylinders than are necessary for normal requirements. It is advisable for stocks of nitrous oxide and oxygen for current use to be stored as far away as possible from the vital centres of a hospital, since any direct hit from a projectile in the immediate vicinity of the cylinders would result in a violent explosion.

The controversial subject of chloroform is being revived once more. Although the portability, potency, and non-explosiveness of chloroform might appear to justify its employment under emergency conditions, this drug suffers from one serious drawback. No matter how skilled an anaesthetist may be, his experience will not suffice to prevent the occasional fatality of primary cardiac failure from the action of chloroform. For this reason alone chloroform and mixtures of chloroform and ether are nowadays looked upon with disfavour by most anaesthetists in this country. We may quote three contributors to the anaesthetic series recently published in this *Journal*. Dr. C. Langton Hewer wrote, "Chloroform is an extremely toxic drug, and can cause grave metabolic changes." Dr. J. Blomfield observed that chloroform has been proved "to be potentially too dangerous for a routine anaesthetic." And the feelings of many were summed up by Dr. Helen Lukis in these words, "If only chloroform were safe it would be the

ideal anaesthetic for general practice." The detached observer cannot deny that ether is able to achieve all that chloroform can achieve and with an infinitely higher degree of safety. The demerits of chloroform in relation to ether must be carefully weighed by those who still advocate the use of the former.

The problem of the shocked patient is of special importance in time of war. Where possible, restorative measures should be instituted before proceeding to extensive surgery, but in many cases anaesthesia will be needed before the shock has been overcome. Chloroform is in any case unsuitable for the shocked patient. Spinal anaesthesia is contraindicated on account of the fall in blood pressure which often accompanies it. The intravenous barbiturates, pentothal and evipan, depress the respiratory centre more markedly than do inhalational agents, and also tend to cause a fall in blood pressure. Nitrous oxide and oxygen anaesthesia, or very light ether anaesthesia, is satisfactory, and light cyclopropane anaesthesia is also suitable for the shocked patient. Cyclopropane is likely to be confined to the specialist anaesthetist; some type of closed-circuit (CO_2-absorption) apparatus is necessary in administration of this agent. It is most important to remember that any shocked patient requires much less anaesthetic to achieve a given depth of anaesthesia than he would if he were in normal health. Practical application of this fact will solve most of the difficulties of anaesthesia in shock.

VIRUSES AND CANCER

Speculation is an exercise for which there is no more fruitful field in the whole of pathology than that of virus diseases. The filterable virus itself is something which leaves a good deal of scope for the imagination; its presence and its properties can often be deduced only by indirect methods difficult of application and of no more than approximate accuracy. Although there is much which remains uncertain about viruses as a whole, including even their essential nature, they become problematic in the highest degree when they are considered as causes of cancer. Nevertheless, in spite of numerous difficulties and of gaps in the facts of the argument which can only be bridged by analogy or conjecture, a hypothesis has been built up which regards malignant disease as due directly to the presence of a virus and relegates all other known causes —notably various well-authenticated carcinogenic "irritants"—to the position of merely predisposing agents. One of the leading advocates of this bold and far-reaching idea is Dr. C. H. Andrewes, whose presidential address to the Section of Comparative Medicine of the Royal Society of Medicine (see p. 969) deals with what is perhaps its most difficult aspect. The general virus hypothesis of cancer makes it necessary to assume that the virus is latent in the body, presumably for a long period and possibly throughout life, until its cancer-producing power is set free by some other, possibly chemical, stimulus. It is therefore appropriate to inquire whether other and less hypothetical viruses are known to behave similarly. A full answer to this question is given in the first part of Dr. Andrewes's address. There are indeed many viruses which behave somewhat similarly. The viruses of influenza and poliomyelitis can infect and immunize without producing manifest disease; those of poliomyelitis, fowl-pox, and possibly others persist in the body after recovery from an attack. Still more apposite is the behaviour of two viruses in a third category, since, like the hypothetical cancer virus, they remain latent in the body without inducing full immunity. The first, the virus of herpes simplex, commonly exists in the mouth; occasionally, as was pointed out by Dr. G. M. Findlay at last week's meeting, it exists in other parts of the body; and attacks the tissues only when their resistance is diminished by other causes. The second, virus iii, is believed to be exclusively latent under natural conditions, and can only be brought into activity by successive injections of tissue suspension from one rabbit to another. That viruses can remain latent for long periods is unquestionable; on the other hand, latency is most often seen in the immune individual, and there is certainly no known example of it in which, so far from immunizing, terminates in a steadily progressive infection.

No observations made in recent years have had a more startling effect in the field of cancer research than those of Bittner, which can be used as another item in this argument. Susceptibility to cancer of the mamma in mice, previously thought to be an inborn character, must now be regarded as due to something transmitted from mother to offspring after birth. Of the three things which, according to Bittner himself, this something may be, a virus is certainly the most credible, and most people will share Dr. Andrewes's difficulty in "swallowing a hormone which when taken in infancy will condemn your grandchildren to the development of cancer in their years of maturity." But in spite of suggestive collateral evidence, of which this is an example, it is difficult to get over the solid fact that the presence of a virus cannot be demonstrated in malignant mammalian tumours, whether naturally occurring or chemically induced—at least by those direct methods which serve to demonstrate its presence in tumours of birds. For this formidable difficulty Dr. Andrewes suggests a new explanation, which is both ingenious in conception and picturesque in his elaboration of it. The idea of a "toothless" virus, so happily established in the cells of one individual that it loses its capacity to bite those of another, will serve as a hypothesis until facts are forthcoming either to support

or to condemn it. It may be observed in passing that among bacteria enhanced pathogenic activity in one host is usually accompanied by an increase in capacity to attack others and not a diminution, but the metabolic habits of bacteria and viruses are so different that this comparison may be invalid.

It is not easy to see how the present methods of approach are going to carry this problem much further. Hitherto the study of viruses has proceeded mainly on lines which were first found useful in dealing with bacteria, and where all others have failed the serological method has had to be relied on to yield results unattainable by other means. Any doubts of the specificity of some of the immune reactions observed would seriously imperil the conclusions which have been drawn from existing data. Can the study of this subject only be pursued by adapting to it the methods of bacteriology? Just as viruses differ fundamentally from bacteria, so perhaps do the most instructive methods of studying them. It is difficult to escape the feeling that something is lacking in this obscure subject, and that more of the concrete and less of the abstract and conjectural will only be produced by some altogether new line of attack. That the virus hypothesis of cancer in general is unsatisfying to some minds is due both to this essential uncertainty and to the number of questions which in its present form it leaves without an answer. Let us consider a few of these. Is the cancer virus omnipresent in the human race, or, if not, how and when does the individual acquire it? What is its distribution in the body, and does this vary? Does it ever act in man as the sole cause of malignant disease, or is there always a predisposing cause in addition? Does the body ever develop an immunity to it, and is there one such virus or are there many? Until such questions as these can be answered this hypothesis can have no force or practical interest, and they are not likely to be answered until a means is found of bringing the ordinary run of mammalian cancers within the scope of study from the virus standpoint.

THE STREPTOCOCCI OF SCARLET FEVER

Ever since Sydenham's classical description of scarlet fever it has been recognized as one of the chief causes of morbidity among children and young adults. For decades various devices of administrative control have been directed towards limiting its spread. Innumerable workers in the laboratory and in the field have spent their energy in trying to find effective means of combating the infection. Local authorities have spent vast sums in providing isolation for those with recognizable symptoms of the malady, hoping thereby to protect the public at large. The bacteriologist has been hard on the trail of "the" causative organism. The results to date of these various campaigns can be summed up briefly. Administrative control has failed to accomplish its avowed object, for it is seldom that a case or even a group of cases can be traced to the source. There is no specific remedy, though modification of severe types can be effected. Hospitalization, except for treatment of complications and sequels in individual cases, is futile, for there are always more carriers and potential sources of infection outside the isolation wards than could ever be contained within them. Recent research tends to show that not one sort, but several groups, of streptococci can cause the disease, and what determines pathogenicity is unknown. On the other hand, scarlet fever is not the deadly disease it used to be, nor is it so highly contagious; but can we take credit for this? Scarlet fever is but one of the several manifestations of invasion of the body by certain haemolytic streptococci, and if it is studied from that aspect only solution of the problem will be hard to come by. Would it not be logical, on the analogy of that multiform infection tuberculosis, to group together the different forms of streptococcal invasion under a comprehensive title, "haemostreptosis" (to coin an ugly but expressive word), and study the disease from a point giving a wider view? Already a good beginning has been made in sorting out from the immense genus of streptococci those species that possess haemolytic properties and again dividing them into recognizable groups with marked characteristics. A further step in systematic study is to "locate" them—to find their usual habitat and the circumstances that condition their pathogenic activities. Two pieces of work in this connexion have been recently recorded.[1] In one the precipitin tests have been used with some effect to identify different groups and to distinguish between healthy carriers of non-pathogenic streptococci and carriers of potentially pathogenic varieties. In the other, classification was determined by toxin-antitoxin tests on the white rabbit with a view to discovering the characteristic virulence of certain groups, the types of streptococci prevalent in schools during epidemic periods, and the relation between the haemolytic streptococci found in healthy school children and those found in scarlet fever patients. These researches are but trial borings on the face of the rock, but they show that there is a mine of knowledge waiting to be opened up.

DURATION OF PREGNANCY

Variations in the period of gestation in man are of more than academic interest. Premature delivery has long been recognized as an important cause of neo-natal mortality and morbidity, and there are many who believe that post-maturity is also associated with an increased risk to the foetus. Hauptstein and M. Stockert[2] have investigated a series of cases to determine how far the duration of pregnancy might be influenced by extrinsic factors. They compared results from three distinct periods—the pre-war (1905–13), the war and inflation period (1915–23), and the post-war period (1929–37). All cases were excluded in which (*a*) the first day of the last menstruation was not known for certain; (*b*) the menstrual cycle was not regular and of the twenty-eight-day type; (*c*) labour did not begin

[1] *Amer. J. Hyg.*, 1939, **29**, Section B, 97 and 107.
[2] *Dtsch. med. Wschr.*, 1939, **65**, 630.

and terminate spontaneously; and (*d*) the pregnancy was complicated by a chronic illness. The analyses revealed that there was no difference in the average length of gestation in the three groups, which was 281 to 282 days. One curious observation was that when delivery occurred between January and March the average duration of pregnancy was increased to 283 to 284 days. A similar slight increase was also observed in primiparae. The constant average figure obtained in spite of variations in the social and economic circumstances of the mother can be understood when it is remembered that the German observers carefully excluded all patients whose menstrual cycles were not of the twenty-eight-day type. The evidence submitted by Ogino, Knaus, and others that ovulation occurs approximately a fortnight before the onset of menstruation, irrespective of the length of the cycle, is now widely accepted. If it is admitted that the life of the human ovum after ovulation is only a few hours, and the life of the sperm in the maternal passages only a few days, it follows that the date of delivery as estimated from the first day of menstruation may be considerably in error if the patient has irregular periods or a prolonged intermenstrual phase. For example, with a six-weeks cycle the calculated date of delivery would be approximately a fortnight too early, and in such a case there is an obvious chance of regarding the full-term foetus as being two weeks post-mature. An unusual case, and one which cannot be explained on this basis, was recorded in the *Journal* of June 3 this year (p. 1155) by G. F. Walker. Intercourse took place on three occasions on consecutive days, the first of these on the day following cessation of menstruation. On the third day the husband was accidentally killed, and 315 days later a healthy male child was delivered. Questions of compensation raised a medico-legal problem, and as the chastity of the mother was not doubted the court entered judgment for the child, thus giving legal recognition to a pregnancy of 320 days as calculated from the first day of the last period. In the case of Clark *v.* Clark, recorded in the medico-legal columns of this *Journal* on March 25 of this year (p. 647), the point in dispute was the shortness of the gestation period. The husband alleged adultery by his wife on the grounds that she had given birth to a living female infant 174 days after the earliest possible date on which he could have been responsible. When evidence was produced that labour began after a severe fall and that the infant was markedly premature the president of the court ruled in the wife's favour. It would appear, therefore, that although, as Hauptstein and Stockert have shown, the average duration of pregnancy is 281 to 282 days, a wide possible margin must be allowed for both prematurity and post-maturity.

GASTRO-INTESTINAL DYSFUNCTION

Struck by the number of patients referred for *x*-ray examination of the stomach, gall-bladder, and intestinal tract in whom the most painstaking examinations fail to reveal any sort of organic disease and, further, who apparently respond poorly to treatment, Dr. Barton A. Rhinehart, a radiologist working in Arkansas, has been led to compile an extensive review of his own experiences and of the available literature.[1] Of the large number of dyspeptic patients about one-third have no organic disease, and of the remaining two-thirds many have functional disturbance combined with organic disease. The symptoms of functional disorder are distension, discomfort, diffuse irregular or shifting pains, and constipation, all evidence of neuromuscular disturbance; but these abdominal symptoms may be accompanied and at times overshadowed by general, cardiovascular, and nervous symptoms. The likely causes of neuromuscular imbalance are examined—constipation and increased irritability of the alimentary canal are examples—and found to be allergy, food deficiency, and vitamin lack, especially deficiencies in calcium and vitamin D. The author believes that the element of subconscious mental effect in these disorders is secondary to the real cause—nutritional deficiency. Abnormal motor function is more often a cause of distress than errors of secretion; increased activity of the colonic muscles results in constipation and not, as might be supposed, in diarrhoea. Spasms of the anal sphincter and passage of dry and scybalous stools are the most dependable signs of true constipation. Careful attention should be paid to complete history and to physical and *x*-ray examinations to exclude organic disease. Treatment must achieve three purposes: elimination of irritating factors, whether environmental, psychic, or gastro-intestinal; correction of all deficiencies, especially of calcium and vitamin D; and the specific treatment of complications. Rhinehart's experience is that removal of appendix or gall-bladder is unavailing unless the deficiency state is adequately treated. Cases are reported showing symptoms of the conditions, but results of treatment on the lines suggested are not included. The author has developed his thesis before local medical societies, and now appeals to a wider audience for criticism and support of a method of treatment for this numerous company of sufferers.

[1] *Gastrointestinal Dysfunction*. By Barton Arthur Rhinehart, M.D. Arkansas: Central Printing Company. 1939.

LAMBLIASIS

In 1681 Antonj van Leeuwenhoek of Delft, who was suffering from a chronic entero-colitis, observed numerous parasites of microscopical size in his stools, but he did not attach any pathological significance to his discovery. The same organisms were recovered from the stools of infants with diarrhoea by W. D. Lambl in 1859. Lambl described them accurately but named them erroneously *Cercomonas intestinalis* in a brochure published in Russian in 1860. Later, Blanchard in 1888 renamed them *Lamblia intestinalis*. This parasite belongs to the genus *Giardia* and has a pyriform body, 10 to 20 μ in length and 6 to 10 μ in width, which tails off and presents on its anterior surface a reniform depression around which there are six flagella; in addition there are two flagella at the tail. The *Lamblia intestinalis* becomes encysted in certain conditions; the cysts are oval and greyish in colour, are surrounded by a thin membrane, and are of slightly less dimensions than the parasite itself. In severely affected

cases the daily evacuation of these cysts has been computed in hundreds of millions. The upper part of the alimentary tract is the usual place of lodgment, but any part of the intestine, as well as the gall-bladder and bile ducts, may be infested. Moderate infestation may not give rise to any symptoms, but in the more severe cases the clinical picture may resemble that of amoebic dysentery. Microscopical examination of the evacuations establishes the diagnosis. In a recent review of this subject Chodzko[1] gives quotations from various authors showing that infestation may be intense, prolonged, and apt to set up fatal disturbances—even cancer, according to certain workers. Treatment is not discussed in detail, but it appears that arsenical preparations, especially stovarsol, are effective. Rodents are susceptible to the disease, particularly those associated with humans, and they may, of course, act as carriers. The hygienic aspect of the subject, as the author points out, is important, for the condition is undoubtedly more widespread than is supposed. Figures quoted as to the incidence of lambliasis in some ten or twelve countries can only be regarded as misleading, since they vary so widely according to different observers, though all agree that troops are more often affected by this type of infestation than civilians. In a condition such as this it is difficult to apply preventive measures on a large scale, and if the analogous problem of ankylostomiasis among miners be taken as an illustration of these difficulties the task would appear almost hopeless. Strict attention to individual personal cleanliness is the best safeguard, but at the same time the most difficult to enforce among those principally concerned.

[1] *Bull. Off. int. Hyg. publ.*, 1939, **31**, 457.

IS BOVINE TUBERCULOSIS INCREASING?

Under war conditions the quality, as well as the quantity, of home-produced food acquires enhanced importance. The production of milk, for instance, is likely to be increased in spite of the ploughing of some pasture land, and it is imperative that it should not prove the medium for carrying infection to children whose resistance may be reduced by deprivation in other directions as the result of prolonged hostilities. The failure of the Government's attempt to secure the passage of the Milk Bill last year is therefore to be deplored. There is now, of course, no early prospect of enlightened legislation of this kind. It may be remembered that the beginning of the modern grading system dates from the last war, when tuberculin testing was officially recognized by the Ministry of Food and higher prices were allowed for milk from tubercle-free herds. If this gives a glimmer of hope it is damped by the realization that pasteurization—the only measure we now believe to offer sufficient security—would be much more difficult to extend during war. Since the evacuated have mostly been transferred from large towns, where much of the milk is pasteurized, to rural areas without accessible pasteurizing plants, it is probable that even more children will have to consume raw milk than in the recent past. In these circumstances the records of areas where most of the milk is unpasteurized are of interest. Very full information in this connexion is contained in the annual report for 1938 of Dr. J. Greenwood Wilson, Medical Officer of Health of the City of Cardiff. In this large town about 11,000 gallons of milk are consumed daily. Only 13.6 per cent. is sold as pasteurized, 4.1 per cent. tuberculin-tested, and 1.2 per cent. accredited (in June, 1938), although about 42 per cent. of all the milk sold receives some form of heat treatment. Of 301 routine samples of milk, raw, non-graded, and unbulked, examined for tubercle bacilli, twenty, or 6.6 per cent., were positive. This percentage has only once been equalled in magnitude since 1927. These findings may be compared with the results of meat inspection at Cardiff's large public abattoirs, of which full information has been given in the annual reports over a period of years. The sources of meat stock are, of course, not necessarily the same as those for milk, but the particulars given indicate a general trend in the health of bovine animals. In recent years 13,000 to 15,000 cattle have been slaughtered annually, of which about 1,000 have been cows. Up to 1931 the proportion of cows found tuberculous ranged from 20 to 27 per cent. It then began to rise, and in each year since 1934 it has been over 40 per cent., reaching its maximum in 1936, when the percentage was 51.6. In 1938 it was 41.0. A similar increase, although naturally on a much smaller scale, can be observed in the proportion of heifers and steers showing manifestations of tuberculosis. The reason, therefore, does not seem to lie in any new practice of delaying the age of slaughter of cows, which, like bulls, are more likely to show signs of disease with advancing years. In the absence of any other explanation it is reasonable to suppose that these figures reflect a deterioration in the health of cattle, the evil effects of which on the milk supply may require more radical action than either the local authorities or the Ministry of Agriculture are able to take under the present law.

The Nobel prizes for physiology and medicine for 1938 and for 1939 have been awarded to Dr. Corneille Heymans, professor of pharmacodynamics in the University of Ghent, for his studies of the sinus and aorta mechanism in respiration; and to Professor Gerhard Domagk, of Elberfeld, in recognition of his discovery of prontosil.

Confident that war will not dry up the springs of medical charity, Sir Thomas Barlow appeals in our correspondence columns this week for donations towards the Christmas gift account of the Royal Medical Benevolent Fund.

Sir Robert Hutchison, President of the Royal College of Physicians, will deliver the David Lloyd Roberts Lecture before the Medical Society of London at 11, Chandos Street, Cavendish Square, W., on Thursday, November 16, at 3 p.m. His subject is "Medical Literature."

SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation.

FRACTURE AND DISLOCATION OF THE PATELLA

BY

E. P. BROCKMAN, M.Chir., F.R.C.S.

The most common injury of the extensor mechanism of the knee-joint is a transverse fracture of the patella, the result of a sudden contraction of the quadriceps while the knee is held in a position of flexion. Often such an injury would seem to occur with relatively slight violence. Other fractures, such as a comminuted fracture or a compound fracture, are due to direct violence and are much less common. They result from falls directly upon the patella or from motor-car accidents.

In addition to fractures of the patella two other injuries to the extensor mechanism may be met with. The first is a rupture of the quadriceps tendon just above the patella or a detachment of the whole tendon from the patella. This injury appears to occur in much the same circumstances as does a fracture. The second injury is a rupture of the patellar tendon, which is torn off from its attachment to the lower portion of the patella. The history of the accident, except when due to direct violence, is always much the same, and it would seem to be a matter of pure chance whether the tendon or the patella is damaged. The usual story is that the patient stumbles or misses his step and a sudden effort is made to avoid a fall. The knee gives way and the patient falls down, with pain in the limb. On attempting to rise he finds he is unable to do so, or, if he does get up, discovers that he is unable to walk or to take any weight on the injured limb. The differential diagnosis is seldom difficult. There is a loss of function, inability to extend the limb voluntarily, and immediate or very rapid swelling and pain.

Transverse fracture of the patella with much separation of the fragments is easy to diagnose, as a depression between the fragments can be palpated. Such fracture without separation, whilst it may be suspected owing to the tenderness upon pressure on the bone, may not be recognized without the help of an *x*-ray examination. Likewise a comminuted fracture may be difficult to differentiate on a purely clinical examination. The same applies to a compound fracture, except that there will be a wound over the patella from which blood and serum may leak.

A transverse rupture of the tendon of the quadriceps is often easy to diagnose; if there is any doubt the knee should be flexed slightly, when the separation becomes obvious and pressure on the hole gives rise to marked tenderness. Rupture of the patellar tendon has symptoms similar to those observed in these other injuries, but upon examination a hollow can be felt below the patella, which itself lies on a higher level than does that of the other limb. In addition we must remember that in both fractures and injury of tendons a haemarthrosis is present, except in rupture of the patellar tendon, which is an extra-articular lesion. Also most fractures are associated with a rupture of the joint capsule and the lateral expansions of the tendon, and if the separation of the portions of the patella is considerable these soft structures must be badly torn. If there is no separation there is unlikely to be much damage to the soft structures.

First-aid Treatment

The patient will be unable to bear his weight on the limb and probably will be found lying upon the floor or may have been carried to bed. If he has to be moved the limb may be splinted temporarily with a back splint or, if this is not available, the two lower limbs should be tied together. If the fracture is compound the wound should be covered with a sterile dressing until arrangements can be made to deal with the condition properly. After removing the patient's clothes a clinical examination must be made to decide the nature of the injury. The limb must be radiographed, but as the patient is probably badly shocked it may be wise to wait until the next day before doing this.

Simple Transverse Fracture with no Displacement

If the injury is a simple transverse fracture of the patella with no displacement it can be assumed that the capsule is not ruptured on either side and therefore, beyond protecting the limb from any further violence, it is not necessary to treat the fracture itself. The condition we have to deal with is a traumatic synovitis with perhaps a little blood in the joint. If the patient is in much pain there is a very definite haemarthrosis. The patient is kept in bed to start with, the knee being supported by a pressure pad and bandage. A layer of wool is applied to the injured knee and a few turns of bandage put on; another layer of wool is then applied, with further turns of bandage, followed by a third layer of wool, the bandage now being finished off. Besides splinting the limb this treatment will help to get rid of the fluid. While rest is indicated for the traumatic synovitis the muscular control must be maintained. It is therefore essential that the patient should have a masseuse—not to do any massage, but to help him exercise the quadriceps and if necessary to give faradism to these muscles. As soon as the very acute symptoms have subsided, active movements of flexion and extension of the knee must be begun; they may be increased in range as rapidly as symptoms permit. Treated in such a way, the patient with a simple transverse fracture of this nature should be on his feet within a few days, and if his work is of a sedentary character and transport is easy there is no need for him to be away from work for more than a week or ten days. When all the fluid has disappeared from the joint a crêpe bandage is preferable to an elastoplast bandage: it can be removed for physiotherapy and does not tend to cut in behind the knee or make the skin sore. If the patient's work is heavy six weeks will elapse before he is fit to undertake it. Should he return too soon the knee will fill up with fluid and complete restoration of function will be delayed.

Transverse Fracture with Separation

This, the most common injury, is best treated by open operation unless the patient is very old and there is some

other contraindication. To relegate the patient to a knee cage is a policy of despair rather on a par with the ordering of a calliper for a fractured neck of the femur. Open operation, no matter what its nature, is not a serious procedure, and can be rapidly performed. It is wise, whatever is done to repair the damage, to allow the patient to rest quietly for a few days before operation. After a fracture of the patella the soft tissues become so oedematous that if operation is performed at once it is difficult to identify with any ease the structures one is handling. After a few days the oedema subsides, making the operation easier.

As with most surgical problems, considerable difference of opinion exists as to the most desirable procedure, in the way of open operation, for the repair of this fracture. There are two things we must set out to do at operations: first, the capsule which is torn transversely must be sutured; and, secondly, the fragments of the patella must be dealt with. These may either be wired together or they may be removed. The former is the more classic procedure, and probably cases still occur in which it should be done; but for most patients removal of the patella is the most satisfactory operation, and if upon opening the joint there are already signs of arthritis it quite definitely is the operation of choice. The points in its favour are that it is easy to do and that it can be done very quickly. There is nothing to refracture afterwards, and the chance of the development of an arthritis between the patella and the femur is avoided. Wiring the fragments together, however well done, may leave a ridge on the articular surface of the bone and involve the risk of a chronic persistent pain in the joint. The function of the knee after excision of the patella is excellent, and there is no loss of power in the quadriceps. The only thing that the patient notices afterwards is that when the knee is flexed the condyles of the femur appear very prominent.

THE OPERATION

The limb is prepared in the usual manner, from the groin down to and including the foot. The towels are arranged in such a way that the knee can be flexed without risk of any part not prepared becoming uncovered. It is better not to employ a tourniquet or an Esmarch bandage, because they tighten up the quadriceps and may make it difficult to suture the torn surfaces together.

The fracture may be approached through either a longitudinal or a transverse incision about four inches long over the site of the fracture. The torn fibres of the quadriceps expansion which lie over the surfaces of the fracture require clearing away but not removing. The blood clot which fills the joint is removed. The upper fragment of the patella is held with forceps and dissected out of the tendon of the quadriceps, taking care to keep the scalpel close to the bone so that the tendon remains as intact as possible. The lower fragment is then removed in a similar manner. All bleeding is carefully stopped, and the expansion of the quadriceps torn upon either side is sutured with interrupted sutures of No. 1 chromic catgut. It is not necessary to suture the synovial membrane, and in suturing the capsule care should be taken not to shorten the expansion, otherwise this may contribute to difficulty in obtaining full flexion of the knee. The hole left where the patella has been removed can be closed by suturing the capsule longitudinally in this part. It does not matter if closure is not complete. The skin incision is closed with interrupted salmon-gut sutures and a dressing applied. The limb is then bandaged over layers of wool from the middle of the thigh down to the middle of the leg. This will provide all the splintage necessary. The bandage may need slackening after twenty-four hours.

With the limb in extension active contraction of the quadriceps is started after three days and the patient encouraged to begin slight movements of flexion in another two days. The stitches are removed on the ninth day and the limb firmly bandaged. If the incision is satisfactorily healed active flexion continues and, provided that the patient maintains voluntary power of full extension, can be quickly increased in range. After twelve to fourteen days the patient may be got walking with two sticks, the knee being still supported by a firm bandage or, if he is nervous, a posterior plaster slab. The rapidity with which full function is recovered varies greatly, but in six to eight weeks the patient should be fit to resume all but the most strenuous of occupations, such as climbing ladders. He will have to wait to do this until he has complete confidence in the limb. Sometimes full flexion is difficult to obtain in elderly patients, especially if they have been afraid to bend their knee in the first two or three weeks. Rupture of the capsule in the portion where the patella has been excised is known, but it is rare; when it does occur it calls for a secondary suture.

Suture of Transverse Fracture of Patella

The initial stages of the operation with regard to excision of the fragments are identical with those just given. When the portions of the patella have been cleared they are pulled together so that the fractured surfaces fit, and are held thus by an assistant with two sharp hooks. They may be fixed now by suture, with catgut, of the transverse expansions and the expansion over the surface of the patella, or else the two fragments are drilled transversely and then the material used is threaded through and tied. At one time silver wire was employed for this purpose, but this has been replaced by Viennese twist, size 3. This material has the advantage that it can be tied like an ordinary ligature; silver wire is much more difficult to tighten, and the knot made was very liable, however well it was bent down and buried, to spring up again and cause trouble under the skin: also it often broke. If the patella is wired in this way it is essential to suture the torn expansions upon either side with catgut. The after-treatment is exactly the same as for removal of the patella, except that flexion cannot be obtained so rapidly; if it is, the patella is likely to unite with fibrous tissue and not with bone. Subsequent stiffness of the knee is also likely to be more troublesome than when the patella is removed.

Simple Comminuted Fractures

The treatment of this type of fracture will depend upon the degree of comminution and the amount of separation of the fragments. In many of them, although the patella is split up into a number of pieces, there may be little separation and no evidence of the expansion of the quadriceps over the patella, nor of the lateral expansions being seriously damaged. In such circumstances there is no need to operate upon the knee. The fragments will unite up well, and treatment is required only for a bad synovitis or haemarthrosis. The limb is bound up firmly or, if very painful, fixed on a posterior plaster slab until the pain subsides. The quadriceps are treated to prevent wasting, and movements begun as soon as symptoms permit. The prognosis is good unless the patient develops an arthritis. Should this happen it will be necessary to remove the patella, but it does not follow that an arthritis is bound to develop. After such an injury the patella

always appears to be larger than does the patella of the other limb. In instances where the fragments are widely separated it is better, as soon as the skin has recovered from the trauma, to remove the fragments of the patella rather than to attempt to fix them together. Such a task must be very difficult, and at the best the result will be a joint which is very sensitive and liable to swell upon even the slightest of injuries or over-use.

Compound Fractures

These are fortunately very rare, but are seen in motor-car or street accidents. In such cases the treatment of the fracture is of secondary importance, and attention must be directed to preventing the knee-joint becoming infected. As soon as possible, under an anaesthetic, the wound must be cleaned and any dirt or fragments of bone sticking out of the wound removed. It may be necessary to enlarge the skin wound to enable this to be done. The joint if widely opened must be washed out, but no attempt must be made to repair the damage to the capsule or patella. The surfaces of the wound may be approximated with salmon-gut sutures but not closed tightly, so that any serum which may collect can drain into the dressing and not collect under tension in the joint. The limb must be fixed in a Thomas splint, with skin extension applied to the leg. The dressing should be changed every day, and the stitches removed if any sign of infection appears. Should the joint become infected it will require treatment as for any other acute infective arthritis. When the joint has recovered from the risk of infection and the skin has completely cleared up, the fractured patella will receive the appropriate treatment.

Injuries Related to Fracture of Patella

There are two injuries very closely related to fractures of the patella which require consideration.

Rupture of the Quadriceps Tendon.—This is usually a complete transverse tear, and in nearly every instance if not treated surgically results in a very weak limb. The operative treatment is simple. Through a transverse incision directly over the site of the tear the damaged tendon, with its expansions, is sutured with interrupted catgut. This does not take very long, and the after-treatment is similar to that used in those cases where the patella has been removed. If the rupture is only partial, conservative treatment will give a satisfactory result.

Rupture of the Patellar Tendon.—This is a very rare accident. If the tear is only partial the limb should be fixed in full extension in plaster for six weeks and the patient permitted to get about on crutches. After removal of the plaster active movements may start and, provided full voluntary extension is maintained, flexion may continue to be increased. If, however, the tendon has been completely torn off the lower hole of the patella, conservative treatment will not be sufficient. The patella is pulled up to a higher level by the quadriceps, while the tendon itself contracts. In these circumstances the site of the injury must be explored and the damage repaired. There is little tissue left on the patella to which to suture the tendon back, and it is therefore necessary to use a fascial graft to repair the damage. The lower part of the patella is drilled transversely so that the graft can be threaded through. It is then sutured to the tendon whilst the patella is held by a sharp hook. The limb must be fixed in plaster for six weeks, after which time the quadriceps must be toned up and active movements of flexion begun. Full function will not be restored for four to six months.

Traumatic Dislocation of Patella

This injury is a very rare one. It is always an outward dislocation. The patient is found in acute pain, with the knee held in a position of flexion at about 45 degrees. It may be that some friend has pulled the limb straight and the dislocation has been reduced before medical aid is sought. If the dislocation is seen soon after it has taken place it may be reduced without an anaesthetic. The limb should be held as straight as possible and, with one hand made into a fist placed behind the knee, the patient is instructed to try to press the knee against the hand. This will result in a relaxation of the hamstring muscles, and quite light pressure upon the outer border of the patella will enable it to be lifted forwards, when it will at once slip back into position. If this cannot be done, or if the patient is very nervous, the dislocation may be reduced under gas. Subsequent treatment deals with the traumatic synovitis which results. A pressure pad and bandage are applied to prevent the collection of fluid in the joint, and treatment given to the quadriceps. The joint will lack strength and be sensitive to stress for perhaps a week or two, so that it may swell up. Traumatic dislocation of the patella seldom recurs, and in this respect is essentially different from the habitual or recurrent dislocation which is due to an anatomical abnormality.

THE USE OF RADIUM IN WAR-TIME

WITH APPENDIX ON RADIUM POISONING

BY

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AND

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RADIUM UNDER WAR-TIME CONDITIONS

In response to inquiries concerning the necessity or otherwise for rendering radium permanently out of commission under war-time conditions, we submit the following statement of the position as it seems to us.

The Danger Inherent in Use of Radium in War Time

The danger to life lies in the possibility that through a direct hit by high explosive on a building in which the radium is in use the radium containers might be broken and the naked radium liberated, since radium element which has entered the body is only slowly eliminated and may produce severe injuries and ultimately death.[1] If naked radium is lying about in the open air there will be serious risk that some will be breathed as radium dust. Even in a laboratory where radium is handled under comparatively carefully controlled conditions it is possible to detect radium dust in a sample of the air in the room. Further, the amount of radium which is lethal when fixed in the body is definitely known to be extremely small—namely, about one-millionth of a gramme.[1] Thus the complete destruction of a ward in which 500 mg. of radium was in use on a number of patients might liberate many thousand lethal doses of radium.

It is difficult to find data on which to base an estimate of the proportion of the radium breathed which becomes fixed in the body. By experiments with animals it has been found that of the radium which enters the blood stream 50 per cent. is

[1] See Appendix, "Radium Poisoning."

fairly rapidly eliminated; but about 4 per cent. is still in the system at the end of six months, and 2 per cent. at the end of two years (Rajewsky, 1939). These figures, as might be expected, were found to be subject to wide individual variations. There can therefore scarcely be any doubt that if radium element is to be used under war-time conditions one of the following alternatives must be adopted.

(*a*) The radium might be used at a site where a direct hit by high explosive is a negligible risk.

(*b*) The radium might be used in such a form that it could be transferred to the bottom of the "radium well" within, say, five minutes of an air raid warning. Clearly, no interstitial radium treatment could be given in these circumstances. The most convenient form in which the radium could be used would probably be teleradium therapy. Several existing "radium beam" units are already equipped with apparatus for the pneumatic transfer of radium from the beam unit to a safe, and it would appear to be a relatively simple matter to arrange that the radium, instead of being returned to the safe, be put into a container and automatically lowered down a shaft, thus completely avoiding exposure of personnel and ensuring that the radium was stored in safety. This could probably be done within two minutes of an air raid warning. Arrangements could probably be made to transfer radium in use in the form of plaques, and perhaps radium in gynaecological use, into an ordinary "radium well" within five minutes of a warning. The difficulty here is essentially one of *organization* so as to ensure (i) that no radium is overlooked; (ii) that all plaques are taken from patients simultaneously, so as to reduce the time to a minimum; and (iii) that exposure of personnel is avoided. The details of such organization would have to be very carefully worked out, but such procedure does not appear to present any insuperable technical difficulties.

(*c*) The radium could be used under normal conditions if it were agreed that, should the site be hit while the radium is in use, either the site will be abandoned for all time, or the site will be carefully cleared of all debris by suitably protected workers, and the debris, together with a small depth of undisturbed earth, be buried elsewhere. If suitable precautions were taken the task of clearing the debris need not involve danger to personnel. Radium continually gives off the gas radon, which is injurious in quite low concentrations, but it is probable that even if 100 mg. of radium were liberated in the space of a single ward the radon concentration would not rise to dangerous levels under open-air conditions. Moreover, the concentration can easily be tested before work is started. The danger of breathing radium dust could be eliminated if the workers wore suitable masks (Leitch, 1935). The average concentration of radium element among the debris would be low compared with that in radium ore. Thus, for example, if one wing of this hospital[1] were demolished while one gramme of radium was in use the concentration of radium in the debris would only be about one-hundredth of the concentration of radium in the ore mined in the Belgian Congo. It is to be noted, however, that in removing debris contaminated with radium the latter may be encountered in small patches of high concentration in the demolished building, so that adequate precautions against the breathing of the dust would be imperative for those clearing the debris.

(*d*) *The Use of Radon.*—Although radon is injurious to health if breathed, it is not likely that the liberation of even as much as 500 millicuries by complete demolition of a building would appreciably add to the loss of life and injury caused by the high explosive itself. The site would not be permanently contaminated. The radiation from radon filtered through 0.5 mm. of platinum is identical with that from radium element of the same degree of filtration. In the case of radon irradiation the intensity of the radiation is high at first and falls away to zero (unless fresh radon is introduced), with a half-value period of three and a half days. In all other respects radium or radon may be considered to be identical sources of radiation. The radon plant could be set up either in such a position that the risk of a direct hit is negligible, or in a naturally occurring cave or tunnel or a specially constructed "bomb-proof" chamber.

[1] The Mount Vernon Hospital—a solidly built two-story building with subway. The wing measures about 35 feet by 150 feet.

APPENDIX ON RADIUM POISONING

Below are listed a number of papers dealing with this subject published during the last ten years. It is evident that during the earlier part of this period the difficulty of measuring minute quantities of radium in a living person, and tiny radon concentrations in the breath, led to much inaccuracy and conflicting results. However, in the work of Rajewsky (1936, 1939; Janitzky, Krebs, and Rajewsky, 1938) and Robley D. Evans (1933, 1937; Evans and Aub, 1937; Aub, Evans, Gallagher, and Tibbetts, 1937-8) accuracy of measurement has reached a high standard—Evans (1937) can measure down to 0.2 microgramme in a living person—and their results seem reliable and consistent. Among earlier papers a series of four in the *American Journal of Industrial Hygiene* on conditions in the watch-dial painting industry is notable (Ives, Knowles, and Britten, 1933). From a study of this literature the behaviour of radium after its introduction in the body appears to be as follows.

Most of the radium taken by mouth is rapidly eliminated—about half in a few days and 90 per cent. in a few weeks. The rate of elimination continually diminishes, however: after six months it is about 0.02 per cent. of the remaining radium per day, after one year 0.004 per cent., and after ten years 0.003 per cent. The amount of radium still in the body after one year can for practical purposes be considered as fixed there. If the radium is taken intravenously the initial rate of elimination is about half as quick, but after a few weeks the rate becomes the same. However, owing to the slower start a given quantity of radium taken intravenously will always show a higher residuum than if it is taken by mouth. Rajewsky (1936) says that about 0.5 to 1 per cent. of radium taken by mouth and from 2 to 5 per cent. of radium taken either intravenously or by breathing becomes fixed in the body. Evans (private communication) has found that the fractional retention of radium taken by mouth is from 1 to 5 per cent., and he believes that for intravenously injected or breathed radium the retention is about 10 per cent.

In the first week or so radium is distributed throughout all the tissues; it then becomes concentrated in bone trabeculae and finally in the bone cortex. However, the concentration is by no means uniform throughout the skeleton. The distribution found by Rajewsky (1936) in a woman poisoned by breathing radium dust, who died three years after her last exposure, is given in the table:

	Per cent.		Per cent.
Lung	9	Thigh bone	21
Heart	0.0007	Rib	32
Liver	3	Vertebrae	34
Spleen	0.007		

Schlundt and Failla give the following radium concentrations in various bones:

Humerus	2.7×10^{-9}	grammes radium per gramme dry bone
Rib	3.4	
Vertebra	5.2	

During the early part of the history, radon in the breath is about 50 per cent. of that produced by the radium, but after some years, when the radium is fixed in the bones, this drops to from 3 to 10 per cent. (Rajewsky, 1936). Elimination of radium at this stage is 90 per cent. in the faeces and 10 per cent. in the urine (Evans, 1937).

The fatal dose is usually stated in terms of the residual radium at the time of death. However, as death may be as long as ten years after the radium intake, the actual damage to which death is due may have been caused by the much larger quantities originally present. Evans describes the case of a watch-dial painter who was examined for radium once a year for eight years with negative results, presumably by a crude method. He developed necrosis of the jaw, and just before he died Evans (1937) measured a total content of 1.2 microgrammes. Rajewsky (1936) describes the case of a woman

whose death resulted from the breathing of radium dust (lung carcinoma) five years after starting employment in a radium laboratory. After her death 6 microgrammes of radium were measured in the body; the lung, which was the site of the immediate cause of death, contained less than 1 microgramme. Several similar cases can be quoted, but in contrast to these are two women described by Evans (1937). The first had intravenous injections of radium chloride ten years back and still contains 8.5 microgrammes. Her weight is 160 lb. and height 5 ft. 8 in. The second took radium by brush-licking while watch-dial painting during 1922 to 1929, and in 1937 was still so employed, except that a glass pen technique was used. She then contained 9.7 microgrammes, and her weight was 116 lb. and her height 5 ft. 5 in.

Evidence of harmful effects of radium less serious than death is contained in the *American Journal of Industrial Hygiene* reports (Ives, Knowles, and Britten, 1933). An investigation was made from June, 1929, to March, 1930, on two groups of watch-dial workers: Group A, seventy persons, all having started work after brush-licking had been abolished on January 1, 1927; Group B had worked before that date. Group A contained persons who had from 0.1 to 2.4 microgrammes of radium due to breathing radium dust. They showed a tendency to a lower red cell and haemoglobin determination than in a group of controls. Bone changes for Groups A and B, classified against radium content of the individuals, are shown in the table:

Microgrammes	Per cent. with bone changes
1	5
1 to 1·9	12
2 to 2·9	17
3 to 4	40
4 and more	100

These measurements were made during exposure to radium intake and within relatively few years of the first exposure, in contradistinction to the earlier cases mentioned, which had all the radium fixed in the skeleton for some years.

According to Martland (1931; McClelland, 1933), for several centuries the underground workers in the cobalt mines of the Schneeberg district and in the pitchblende mines of Joachimsthal have been subject to a pulmonary disease resulting in death in middle life. An official investigation extending over three and a quarter years resulted in a diagnosis of carcinoma of the lungs in 62 per cent. of the deaths among miners. During the same period examination of 362 persons in the same districts, not working in the mines, discovered no indication of malignancy in the lungs. These deaths have been variously ascribed to rock dust, dampness, volatile arsenical compounds, chrome and arsenic dust, but, as the air of the mines is distinctly radio-active and as breathing radium dust in laboratories has been shown to produce lung carcinoma, the radio-activity of the air must be regarded as a likely cause.

From a consideration of these papers it seems probable that, though there is a considerable variation from one person to another, an ingestion of about 500 microgrammes will lead to a fixed quantity of about 5 microgrammes, causing ultimate death. In some cases as little as 50 microgrammes might produce this result. These quantities are roughly halved if radium is taken intravenously; but it is difficult to deduce from this the fatal dose which must be inhaled, as we have no data on what proportion of dust inhaled is retained in the body.

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Rajewsky (1939). The Problem of Radium Poisoning and Tolerance Dose. *Radiology*, **32**, 57.
A general review of the subject, giving data obtained in the author's laboratory for the distribution of the radium between various organs and the rate of elimination (mostly from animal experiments). Brief report of two cases of radium poisoning in human subjects.

Radium Hazards in Industry

Ives, Knowles, and Britten (1933). Health Aspects of Radium Dial Painting: Measurement of Radio-activity in Workers. *Amer. J. industr. Hyg.*, **15**, 433.
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*** A more complete discussion of radium poisoning, written by Dr. J. Read, will appear shortly in the *British Journal of Radiology*.

Dislocation of Hip.—In about 5 per cent. of all patients with congenital dislocation of the hip the deformity is combined with other malformations. In such cases the dislocation of the hip appears to be caused by mechanical factors and should be regarded as a secondary deformity. Twenty-eight illustrative cases are described by the author and the previous literature is reviewed.—Significance of Dislocation of Hip combined with Other Malformations for Problem of Dislocation of Hip.—W. Müller.—*Z. Orthop.*, May 30, 1939, **69**, 293.

THE EMERGENCY HOSPITALS' OPPORTUNITY

"Somewhere in England"—in one of the London sectors, in fact—an emergency hospital has been prepared, like hundreds of others, for the reception of air raid casualties. Part of this hospital is a workhouse building, one hundred years old, which has been adapted for the purpose; the other part consists of more modern buildings, together with some recently constructed hutments. Altogether the hospital will accommodate between 800 and 1,000 patients. The staff includes fifteen specialists.

It is regarded as important that the hospital should provide in-patient facilities for London patients who have been deprived of hospital service in their partly evacuated city. It is true that the Ministry of Health arranged for patients actually occupying beds in in-town hospitals, and not fit to be sent home, to be accommodated elsewhere; but provision for the constant accession of fresh cases was limited. This hospital, thirty or forty miles from London, is in effect functioning as a London hospital, to which patients are brought twice a week in motor coaches converted to ambulance use.

The medical superintendent and his staff are keen on making some local contribution to the emergency. The hospital is situated in a town whose normal population has been increased by 30 per cent. since war began owing to the presence of evacuated persons from London. There is only one other small general hospital, which even before the war was always filled to capacity. Accordingly the emergency hospital is proposing to start various clinics to which local practitioners may send patients for consultation. The specialist units will deal with both local and transferred cases. The ophthalmological unit, for example, will take cases from Moorfields and from the ophthalmological departments of other London hospitals as well as cases arising at its own doors. The same is true of the dermatological unit, the maternity unit, and the projected dental unit, which last will also deal with facial injuries. A first-class pathological department has also been established, half of its equipment coming from one London hospital and half from another. In addition the hospital service has a training school for student nurses, fifty of whom have been transferred from a school in London with their sister-tutor. Again, the hospital expects to receive military casualties from the front.

The trouble, almost inevitable in any scheme of emergency organization, is that while those on the spot take a long-range view and are eager to grasp new opportunities, a more remote officialdom insists on regarding all such hospitals only as improvisations to meet a temporary emergency. This has the unfortunate result that, whereas the provision is in many respects on generous and enlightened lines, in others it is wholly inadequate to the situation, at least to the situation as those on the spot appreciate it.

Experience of an Up-graded Hospital

The hospital consists of an old workhouse building, newer infirmary and casual blocks, and a number of recently constructed hutments. A wing of the old workhouse has been transformed into a psychiatric unit, for which it offers advantages, consisting as it does of a number of small wards, each with four or five beds. The unit, which is self-contained, thus ensuring the quiet which is essential, is in charge of two London psychiatrists who will from the beginning be able to deal with the more difficult cases of neurosis. Its sister-in-charge was trained at the Cassel Hospital. The unit will take in not only shell-shock cases but civil cases of nervous collapse. One of the old day rooms has been turned into a room for occupational therapy, another into a dispensary, and a third into a dental clinic. What was formerly a school room for the Poor Law children, and was afterwards used as a chapel, though not consecrated, has also been turned into a ward. The old reception wards have become first-aid posts. A part of the building is still appropriated to the use of the workhouse inmates.

The infirmary part of the institution, which is of more modern construction, has been arranged to take 150 beds, which are fully occupied by local and transferred cases. The maternity unit also has been established in this part of the building. In the former casuals' block the dormitories have been made into wards for ambulatory cases, fitted with bathrooms and sinks, and afford accommodation for seventy or eighty patients. The room where the tramps had their meals is now a receiving room for local air raid casualties, for it has to be remembered that in the unpredictable course of air warfare even a country hospital may have casualties at its doors. Provision is made for urgent operations, and sisters, nurses, and orderlies are in attendance. Twelve cell-like cubicles in which the former inmates were sometimes isolated for various reasons have been transformed into individual consulting rooms. In this part of the building arrangements are made for the care and treatment of school children, cleansing facilities being provided and examinations made for conditions such as scabies and impetigo. It should be added that the old associations of the place are so far as possible eliminated by the cheerful scheme of decoration employed. Even the frames which have been put up to darken the windows have their monotony relieved by designs by local artists.

Hutments: Advantages and Some Criticisms

In the garden of the institution there have been set up eleven ward huts, each equipped for forty-two patients. The dimensions of the huts are 108 feet long by 25 feet wide. One hut of the same size is assigned solely for the purpose of an operation theatre and *x*-ray department, and another for that of kitchen to serve the whole establishment. The huts are built of breeze blocks on a frame, and a concrete wash gives them the appearance of concrete houses. The roofs are of corrugated iron. There is a great deal to be said for the way in which this construction has been managed. The planning is good, with plenty of window space. A sufficiently wide gangway runs down each hut between the rows of beds, and the beds seem to be spaced adequately. Each of the wards is heated by three Canadian stoves down the middle, and hot water is supplied by a separate boiler for each hut. The only hut to be centrally heated is the operation block. Each hut has its own service kitchen, bathrooms, lavatories and sluice room, and dressing room.

The operation block includes a sterilizing room, a room for dressings, surgeons' and nurses' changing rooms, and space for the storage of theatre linen. The theatre has four tables, lighted by shadow-proof lamps, but only two sinks or washing places, and these located together at one corner. The *x*-ray room is large, and rooms are provided for developing and viewing.

While there is much that is admirable in the hutment arrangement, certain disadvantages, each relatively small but in their cumulative effect likely to prove a severe handicap in times of pressure, make themselves obvious. For example, in each ward only one sink has been provided. There are no chairs, ward tables or cabinets, or bedside lights, so that injections and examinations will have to be done either by the light of a torch or of the pendant lamps from the ceiling. Again, there are no means of keeping food hot after it comes from the central kitchen, which is in another hut at some distance from many of the wards. A more serious complaint relates to the construction of the beds, which are of a light collapsible type and without castors. Yet another criticism is that the space between the huts has merely been dug over and left, so that it is impracticable—even if the beds had castors—to wheel patients out into the open air as it would be if the space were gravelled; yet french doors have been provided.

The hut where operations are done is under the disadvantage of being approached by a pathway which certainly is roofed over but is otherwise open to the weather, so that patients carried in and out must be exposed to the cold air. The anaesthetics room also is not happily placed, and in the

absence of partitions the anaesthetizing of patients takes place in what is practically a public thoroughfare. Similarly, the approach to the *x*-ray room compels the patients to be taken either through the operating theatre or out into the open right round the building.

The staff at this hospital are billeted out, with the exception of forty nurses, for whom there is a nurses' home in the old infirmary block. A skeleton staff is always in attendance, while others are at call.

SULPHONAMIDES FOR INFECTED WOUNDS

PROPHYLAXIS AND TREATMENT

In our issue of October 21 (p. 834) we published a War Office memorandum concerning the use of sulphonamide derivatives for prophylaxis and treatment of wound infections. Supplementary Memorandum No. 1 is now being distributed from the War Office to all officers of the Royal Army Medical Corps.

War Office Supplementary Memorandum

In the above-mentioned memorandum (A.M.D. 7, dated October 11, 1939) it was emphasized that there is no evidence yet available for assessing the reaction to these drugs of persons suffering from shock. The fact that they may stand the drugs badly is probable. It is therefore advisable that the first batch of cases to which sulphonamide derivatives are administered for the purpose of prophylaxis or treatment should be carefully observed. If patients are severely shocked, treatment with these drugs would be better suspended until the circulation, temperature, and urinary excretion have been re-established to reasonable levels by treatment of the shock *per se*. Should there be evidence which indicates that the drugs, in the doses suggested, are not well tolerated, administration should be suspended or the dose reduced.

If experience shows that the dosage given in the original memorandum is too high, it is suggested that the undermentioned modified course of prophylaxis and treatment should be tried on a further batch of cases.

Modified Course for Prophylaxis and Treatment

SULPHANILAMIDE AND M & B 693

Prophylaxis.—Total of 3 gm. per diem to extend over a period of four days, administered as follows: 1 tablet every four hours for four days.

Treatment.—First twenty-four hours: Total dosage 4 to 6 gm., according to severity, but in extreme cases, such as septicaemias, up to 9 gm. Spacing of dosage: Four-hourly, so that half the total dose is given during the first two administrations, and the balance equally divided between the remaining four administrations. Second twenty-four hours: Total dosage and spacing similar to the first day. Subsequent days: Dosage to be guided by the condition of the patient, reducing the administration of the drug to 2 to 3 gm. per diem. Total period of administration not to exceed nine days.

IMPORTANT INSTRUCTION

It is extremely important that when patients who have received prophylactic or curative treatment with these drugs are transferred from one medical unit to another, clear indication should be given in the transfer documents as to treatment, and, in particular, which drug has been employed, as well as the *total* dosage given. If this is neglected there may be a grave danger of overdosage, with the consequent risk of agranulocytosis. Individuals who have been found to be unduly susceptible to sulphonamide derivatives should have this fact clearly stated on their documents, in order that the drugs may not again be administered at some future date. Susceptible persons inevitably suffer a recurrence of complications when a fresh course of the drug is instituted.

A.M.D.7.
War Office,
November 1, 1939.

Reports of Societies

LATENT VIRUS INFECTIONS: THEIR BEARING ON THE CANCER PROBLEM

At a meeting of the Section of Comparative Medicine of the Royal Society of Medicine on November 1, Dr. C. H. ANDREWES of the National Institute for Medical Research delivered his presidential address on the subject of latent virus infections and their possible relevance to the cancer problem. He said that animals and plants might harbour viruses within their cells though showing no evidence of disease; bacteria, too, might carry a bacteriophage which did not materially affect them. Such phenomena might be called "latent virus infections."

Transient and Persisting Infections

Dr. Andrewes spoke in the first place of transient latent infections—namely, those diseases in which an animal became infected with a parasite, the infection ran its course, and the parasite ordinarily ceased after a time to be recognizable, but at no stage did overt symptoms of disease occur. A small quantity of residual virus might be very hard to demonstrate in a recovered animal, and therefore it would be more accurate to call this group "apparently transient latent infections." The natural subclinical immunization of many human beings against diphtheria might be ascribed to transient latent infection. Many inhabitants of the yellow fever regions of America and Africa had neutralizing antibodies in their serum though they had never suffered from classical yellow fever. During the course of influenza epidemics the serum of many persons showed substantial rises in neutralizing antibodies against the virus, though the people concerned remained in perfect health. The majority of adults had antibodies against poliomyelitis virus in their blood, probably indicating part contact with, and even inapparent infection with, the virus of infantile paralysis. He also mentioned a bird disease, psittacosis, saying that it was a normal course of events for budgerigars nesting in aviaries in California to develop a symptomless infection, associated with enlargement of the spleen, with psittacosis virus.

His second group consisted of persisting infections with virus as a sequel to overt disease. After an overt attack of a virus disease the virus might continue to be harboured by the host after the disease symptoms had long since disappeared. Poliomyelitis virus had been recovered from nasal washings of man during convalescence, and the very similar virus of mouse paralysis had been found in the spinal cords of recovered mice for as long as a year after infection. Fowls infected with the virus of fowl-pox continued to carry it for long periods, particularly in the liver. The virus of foot-and-mouth disease had been, according to some workers, detected in the urine of hyper-immunized cattle 246 days after infection. Other examples were lymphocytic choriomeningitis and equine infectious anaemia. Virus might be masked by antibody and therefore hard to demonstrate. Some workers believed that persistence of virus after a disease was the rule, life-long immunity being explicable as an infection immunity, an immunity which persisted only because the virus has never completely died out of the body, but Dr. Andrewes thought that caution was needed before accepting that hypothesis.

Indigenous Virus Infections

A third group consisted of indigenous virus infections, which were symptomless like the first group, persistent like the second, and in addition usually infected their host very early in life, possibly making their entry in infancy or even *in utero*, or being handed down from the parent in the germ plasm. This type of host-parasite relationship had been described as perfect parasitism, an association in which the two partners were perfectly adapted to one another, neither

causing the other inconvenience, and with admirable arrangements for perpetuating the partnership from one generation to the next. Dr. Andrewes discussed a number of examples such as lysogenic bacteria, viruses carried by normal potatoes, lymphocytic choriomeningitis, herpes simplex, virus III of rabbits, and mouse-pneumonia viruses.

His final class was complicated latent infections. Evidence had recently been brought forward to suggest that the virus of swine influenza might pass through an intermediate host in lung-worms. The ova of such worms might be passed in an infected pig's faeces, be ingested by earthworms, in which some stages of the life cycle might be passed, and then these earthworms might be eaten by other pigs and the lung-worms find their way through the intestinal walls back to the susceptible tissues in the pig's lungs. But this was not enough to make a pig go down forthwith with swine influenza. The virus would lie harmlessly in the worms until some provoking stimulus lit up the infection.

Latent Viruses and Cancer

Three important features kept recurring in many of the instances he had mentioned—namely, ubiquitous occurrence, infection from early life onwards, and possibility of upsetting the host–virus equilibrium with production of disease. Theories about cancer which claimed a role for virus in the aetiology must postulate that such viruses were very widely distributed in the animal kingdom and that they were normally latent infections but could be lit up by some stimulus such as the application of a carcinogenic hydrocarbon. Admittedly there was little direct evidence that cancer was caused in the manner suggested, but some facts in experimental research seemed to point in that direction.

In considering certain neoplastic diseases in the light of this knowledge about virus infections, he began with fowl paralysis (neurolymphatosis), an obscure disease which was certainly related to neoplasms. Dalling had stated recently that there were three theories of the nature of fowl paralysis—that it was an infection, that it was a tumour, and that it was a virus disease. While "reluctant to introduce the Athanasian Creed into pathology," Dr. Andrewes suggested that here there were not three explanations but one explanation—an infection with a tumour virus would serve as a theory to cover all the facts. Evidence in some recent work by Blakemore had been obtained suggesting that fowl paralysis was the chronic stage of an acute disease which might naturally be wholly or largely symptomless. There was as yet no proof that the agent was a virus, but analogy with similar conditions in fowls, such as leukaemia and sarcoma, made it very probable. There was also evidence that environmental factors might determine whether or not a latent infection would blossom out into declared disease.

Another neoplastic disease which might be considered in the light of this knowledge about virus infections was tar sarcomata in fowls. Most normal fowls as they grew older developed neutralizing antibodies active against filtrates of Rous sarcoma virus; the antibodies were, however, usually low in titre compared with those found in birds bearing slow-growing tumours. Their presence suggested, although it did not prove, that many normal fowls might carry or had had contact with a virus serologically related to tumour viruses such as described by Rous. There was evidence that tumours induced in fowls by injections of tar or other carcinogens might generally owe their continuing malignant character to the action of a tumour virus within the cells, such a virus having been liberated from some restraint by the poisoning of the cells by the tar.

The Heredity Factor

Yet another piece of work of interest in this connexion was Bittner's experiments with breast carcinoma in mice. Some strains of mice used in cancer research work had an incidence of breast cancer in breeding females of 80 to 90 per cent., whereas in others the incidence was almost *nil*. In hybrids between two such strains it had been found that the incidence of breast cancer in the offspring depended not upon Mendelian rules but wholly upon whether the mother came from a high- or a low-cancer family. Only the mouse born from a "high-cancer mother" developed breast cancer in later life. Bittner had found that mice from the low-cancer strain would develop a high proportion of cancer if suckled from birth by high-cancer-strain mothers; conversely, mice from high-cancer mothers showed quite a low tumour incidence if fostered by mothers of low-cancer strain. It looked as though something affecting the occurrence of cancer in later life were transferred to the young in mothers' milk. But there were still stranger findings. If young mice of the low-cancer stock were suckled by high-cancer mothers and developed cancer later despite their hitherto unstained "family escutcheon," then, on inbreeding them, their children and grandchildren were also very liable to breast cancer. On the other hand, the young of the high-cancer stock which escaped the disease through being fostered by low-cancer mothers were able to pass on their freedom from cancer to their descendants. Dr. Andrewes added that Bittner had considered whether the agent transmitted in the milk might not be a hormone. "I can swallow some things, but it is hard to swallow a hormone which, when taken in infancy, will condemn your grandchildren to the development of cancer in their years of maturity." But on casting one's mind back to some instances of indigenous virus infections it was not too difficult to believe that Bittner's high-cancer mice were infected with an indigenous virus which normally remained quite latent, and ultimately a series of stimuli, perhaps acting over a long period, revealed its role as a causative agent of breast carcinoma.

Theory of "Toothless" Viruses

After mentioning other work Dr. Andrewes suggested that a virus might depend for its power to infect normal cells on some, possibly haptene-like, aggressive mechanism—"teeth," as it were—permitting an entry into the new cell. In certain circumstances a virus might perhaps lose its "teeth" by disuse atrophy, as armadillos and ant-eaters had done. One might imagine that this could happen most readily in the environment of the cancer cell, where virus could be carried on from cell to daughter and granddaughter cell as division was stimulated, and the need to come out of the cell to look for fresh prey would disappear. The virus which had become "toothless" by some such process could thus act as a proximate cause of cancer, and yet one would never be able to demonstrate its presence by injecting tumour extracts into fresh hosts. Roundabout methods of revealing them would always be necessary.

It was not very easy to reconcile the conception of a "toothless" virus in the cancer cell with the need for visualizing some possible means of carrying the virus over from one generation to the next. Complete "toothlessness" seemed to involve transmission through the germ plasm; relative "toothlessness" would allow a little more latitude. "Toothless" viruses need not be found only in cancers. Might not the viruses which, as some thought, must persist after infections and be responsible for keeping up a lifelong immunity be capable of being modified or made relatively "edentulous" instead of merely being masked by antibody?

He disagreed with the recent suggestion by Green that a cancer virus in a cancer cell was the highest conceivable form of parasitism, virus and cell having their division exactly synchronized—almost a virus–host hybridization. The perfect parasitism was rather the association of a latent indigenous virus and its host, neither doing any harm to the other. Such a compromise had probably evolved in more instances than were suspected. Cancer, when it occurred in animals, would then be due to the incursion of some unexpected factor—a *tertium quid*, which broke up the happy association; a disease affecting both partners, of advantage to neither. Instead of human cancer being considered as a disease of man caused by a virus it would then be necessary to consider it as a disease of the man–virus partnership. To sum up, the association of hosts and parasites, particularly viruses, might lead not to violent disease but to a certain "balance of power," which might at times be upset with the result that the disease occurred after all.

Discussion

In some discussion following the address, Dr. T. W. LUMSDEN, taking up one remark regarding breast carcinoma in mice, said that he did not gather when he saw Bittner, whose work Dr. Andrewes had quoted, that he claimed that if the mice with a low-cancer strain were suckled by a mother with a high-cancer strain there was any constant increase of cancer incidence in the young. He thought everyone agreed that the reverse was the case—there was no regularity at all.

Dr. ANDREWES remarked that his own statements had been made on the basis of Bittner's published figures.

Dr. G. W. M. FINDLAY recalled a book by Dr. W. O. Stapledon, *Last and First Men*, in which he pictured the human race some millions of years hence being attacked by the Martians with masses of various particles which had the property of receiving and transmitting short- and long-wave radiations. A large part of the human population was thus killed off, and it was only when man managed to incorporate the various particles into himself, thus converting himself into a receiving and transmitting station, that he overcame the forces arrayed against him. That seemed an analogy on the physical plane for Dr. Andrewes's argument on the biological. Latent infection in yellow fever was extremely well seen in the African wild monkey; many of these animals were found to have immune bodies to yellow fever. It was well known that man could form reservoirs of latent herpes virus in very peculiar situations. A friend of his always got genital herpes on taking a Turkish bath. A girl now 8 years old, when she was 2½ fell down and grazed her palm; a bullous eruption formed, and ever since then, at intervals of three or four months, she had the same type of eruption, from which the herpes virus could be obtained. Psittacosis in parrots and budgerigars had been mentioned. This infection could apparently continue latent for a long time. Some years ago the wife of a well-known American became possessed of a parrot of which she was very fond. The bird was apparently in good health, but after eighteen months or two years the lady developed psittacosis, and it was then found that the parrot was excreting psittacosis virus in considerable amounts.

Mr. J. T. EDWARDS said that the conception which Dr. Andrewes had brought forward was not very difficult for those who practised veterinary medicine on domestic animals. It had long been recognized that neoplasms in fowls might be caused by filter-passers. Rinderpest in cattle could be transmitted to rabbits, causing merely a transient latent infection. Dr. Andrewes had quoted German workers (Waldmann, Trautwein, and Pyl) to the effect that the virus of foot-and-mouth disease could be detected in the urine of hyper-immunized cattle more than 200 days after recovery. The speaker was very sceptical about that statement. The fact was that the virus would not survive in the urine. The observation was more likely to be explained by an accidental infection. He referred in conclusion to the great difference between viruses: some were extremely difficult to kill, persisting for years in the laboratory, whereas others were very fragile. What was the cause of this difference? Was it not possible that in the case of mammalian cancers the virus was extremely fragile, and when released, perhaps by adsorption on the proteins of the host cells, it immediately became inactivated and not able to persist independently as in the case of avian agents?

Dr. TOM HARE was not sure whether Dr. Andrewes had suggested that in fowl paralysis (neurolymphatosis) the causative agent was a virus. Perhaps he had merely claimed that from the results obtained by certain workers it appeared that a virus was present. That view was certainly held by a number of workers in America and on the Continent as well as at Cambridge. But from his own work during the last five years he found it very difficult to recognize fowl paralysis other than as inherited as a Mendelian recessive. It might be possible that a virus had passed through the germ plasm, but it was extremely difficult to visualize that it would so pass in almost strictly Mendelian proportions. Again, where fowl paralysis was firmly established on a farm year after year one would expect some increased virulence of the virus so that there would be transmission to other "healthy" strains if in close contact—not solely in adult life, but from hatching onwards—with the fowl-paralysis-bearing strains.

Dr. J. H. DOUGLAS WEBSTER said that from a clinician's point of view one of the most striking characteristics of an established tumour was that it often showed periods of quiescence which alternated with periods of activity. The late Sir John Bland-Sutton used to say that in speaking of the progress of a growth "recurrence" was not the right term; it should be called "incomplete operation." But it was a question whether he was right. The operation might have been complete as regards the cell but not as regards the virus infection. He had found after a certain amount of study of the subject that cancer recurrences showed a certain periodicity almost exactly similar to that shown by influenza. The periodicity of influenza, which was a known virus disease, resembled closely that of malignant disease and of a number of benign tumours and leukaemia. There was no necessity to accept Dr. Andrewes's suggestion of a *tertium quid*. Here was a virus infection which went into hibernation, and then the virus, from some unknown intrinsic cause, started reproduction, and the patient had recurrences which, in his belief, came in periodical cycles. The only thing that he could say with regard to the *tertium quid* was that in one series of patients a few weeks after an influenza attack he had seen cancer recurrences and cancer primaries occur. The influenza was possibly the *tertium quid* which had stimulated the appearance of malignancy. In a few other instances he had found malignancy, primary and secondary, immediately after the cessation of menstruation, which suggested the possibility of a hormonal *tertium quid*.

Dr. ANDREWES said that Dr. Hare had asked for an explanation of how a virus could be transmitted as a Mendelian character, particularly as a recessive character. He would prefer not to have to produce a hypothesis until he was confronted with the evidence. He thought that there was need for caution in accepting any suggestion that a cancer had a purely hereditary character, although it had undoubtedly hereditary characteristics.

Local News

ENGLAND AND WALES

Tuberculosis in Wales

Special interest attaches to the annual report of the King Edward VII Welsh National Memorial Association because it includes an excellent summary of the recommendations (which more particularly affect the association) of the Committee of Inquiry into the Anti-Tuberculosis Service in Wales and Monmouthshire. The report of this committee, which covered a much wider field than that originally fixed by the terms of reference, attracted considerable attention, and has already been noticed in these columns (*Journal*, March 18, 1939, p. 577). Those who find the original report too long for study would do well to read and digest Dr. D. A. Powell's summary. Commenting on the committee's findings, Dr. Powell points out that they confirmed the contention of the association that the failure of local authorities in many areas to carry out their statutory duties in the prevention of the disease was chiefly responsible for the fact that since 1915 the death rate from tuberculosis in Wales had not fallen as rapidly as in England and Scotland. "Because the patient (and naturally he looms large in the public eye) is the responsibility of the county," states Dr. Powell, "many sanitary authorities seem to assume that tuberculosis (a much bigger issue than the tuberculous) has very little, if anything, to do with them. The county council, on the other hand, has been too ready to act on the assumption that it is not quite the thing even to take an active interest in, and still less to interfere with, the work of the smaller authorities within its administrative

area." This is all the more deplorable since "in virtue of their joint responsibility the county council and the Minister of Health have the power to supervise, augment, compel, financially penalize, or *supersede* the efforts of local authorities." Dr. Powell discusses the remedies, and emphasizes that the committee completely vindicated the association. The greater part of his report contains the usual statistical tables and references to the different dispensary areas and institutions, and illustrates the expanding work of the association limited by the special difficulties in Wales.

Tribute to a Yorkshire Doctor

Residents of South Milford, Yorkshire, on October 18 assembled at St. Mary's Church to pay tribute to the memory of Dr. A. H. Radcliffe, who lived in the village and died on February 7 after thirty-six years in practice there. A memorial tablet was unveiled by Mr. Harold Collinson, consulting surgeon to the General Infirmary at Leeds, who in a short address commemorated the life and qualities of Dr. Radcliffe. He said that in spite of all the activities of the Ministry of Health and of the public authorities the family practitioner still carried out the major proportion of the medical work of the nation—work which brought him into every household and made him not only an adviser but a valued friend. "He is the standard by which we doctors are measured, and the estimate of the profession in the eyes of the public is their estimate of him. The best doctor is often one of whom the public hears the least. He belongs to the great army of quiet workers, physicians and priests, sisters and nurses, of whom little is heard but to whom is given the ministry of consolation in sorrow, need, and sickness."

Correspondence

Gas Injuries to the Eye

SIR,—Mr. Arnold Sorsby (*Journal*, November 4, p. 927) does not know of experimental work to test whether irrigation with oil is efficient in treating damage to the cornea from liquid mustard gas. I can tell him that much research has been done for the German Army Medical Service, and the treatment is by means of a mixture of cod-liver oil and glucose. The cod-liver oil is emulsified with a little alkali (1 per cent. sodium carbonate). To 100 c.cm. of the mixture is added 4 c.cm. of pituitary (posterior lobe) extract. I do not know the proportion of glucose which is employed.

The use of cod-liver oil rather than olive oil is interesting in view of the value of cod-liver oil as a dressing for burns or infected skin wounds.

This formula for eye treatment has never been published.—I am, etc.,

J. H. BURN,
Professor of Pharmacology.

Oxford, Nov. 4.

SIR,—The leading article in your issue of November 4 on the above subject rightly stresses mustard gas as the most important of the chemical warfare agents in producing eye injuries. There are, however, certain points in the consideration of the subject in this leading article which require comment.

First, the suggestion that the use of chlorinating agents will minimize the effect of a mustard-gas burn of the eye is not in accordance with experimental findings in my experience. The effect brought about by contamination of the eye is immediate, and no amelioration of the injury can result from irrigating with chlorinating agents or any other liquid. The mustard gas remains only momentarily in the eye; it is squeezed out by the lids and washed away by the tears. Irrigation will remove any unabsorbed liquid mustard gas which may be on the surrounding tissues, and will allay irritation, cleanse and relieve spasm, but it will not influence the damage which has already occurred to the tissues of the eye. Irrigation, it is suggested in the article in question, has some value by minimizing the cumulative action of the agent. While this contention is true in so far as skin lesions are concerned owing to the greater resistance of the integument, the argument is fallacious when applied to the ocular tissues. The damage to the delicate membrane of the eye is so rapid that even the immediate rush of tears, Nature's method of irrigation, will do no more than remove unabsorbed mustard gas.

Secondly, there would appear to be some confusion regarding the reason for the instillation of drops of castor oil or liquid paraffin. This procedure is criticized on the grounds that as these substances are solvents for this chemical warfare agent, the action of the gas will be disseminated. In actual practice this does not take place, as unabsorbed mustard gas will have been washed out of the eye by the tears before liquid paraffin or castor oil is introduced. It is argued that as greasy preparations in the treatment of mustard-gas injuries of the skin have not been found beneficial, a similar objection exists with regard to their application to the margins of the lids. While to a certain extent this may apply, the advantage gained by permitting free drainage from the eye, which follows their use, more than outweighs the possible intensification of the established injury to the margins of the lids.—I am, etc.,

War Office (A.M.D.7), Nov. 4. L. T. POOLE.

SIR,—Will you permit me to suggest the use of dielectric oil (which can be obtained from J. Bury, Ltd., 5, St. Ann Street, Manchester) in injuries to the eyes from liquid mustard or other poisonous gases. This oil is simply de-ionized petroleum, but it has some strange properties.

The late Mr. F. H. Bowman, D.Sc., the originator of this form of oil, explained that being dielectric it was absorbed very rapidly, and by surrounding the damaged nerve filaments with an insulating material it prevented the escape of the "neuro-electricity" which he said was responsible for inflammation and pain. Be this as it may, the fact remains that in burns, contusions of any kind, and even in acute pleurisy, the effect of the oil is little short of miraculous. I have used it in various eye troubles and have had some personal experience. Once when painting a fence with creosote a great splash of the creosote flew back into my right eye. I rushed into the house and thought my eye was destroyed, because in a mirror the only thing to be seen was a red ball unrecognizable as an eye. My first intention was to use a soda solution, but seeing a bottle of dielectric I filled my hand with the oil and inverted it over my eye. The pain, which had been intense, was relieved almost at once, and within a quarter of an hour the only sign of trouble left was some redness of the conjunctiva. Some years later I had an acute inflammation of one eye, due to a Koch-Weeks infection. As after some days of expert irrigation it showed little sign of improvement, I had resort to dielectric oil and the trouble cleared up very rapidly.

As liquid mustard gas is oil-soluble, there is a greater probability that the dielectric would prove of use. At all events I am sure that it would remove pain more quickly and permanently than either cocaine or dionine.—I am, etc.,

London, W.1, Nov. 4. ALEXANDER FRANCIS.

Choice and Preparation of Blood Grouping Sera for Emergency Purposes

SIR,—I have read with interest the article by Drs. S. W. Challinor, J. C. J. Ives, and C. E. van Rooyen (*Journal*, October 28, p. 850), and would supplement the information given by them with certain observations that have been made on the large number of sera of Group A and Group B that have been studied since the formation of the Army Blood Transfusion Service.

The authors rightly draw attention to the fact that the size of agglutinated clumps is of value as a preliminary selective test, but the speed with which the agglutination occurs is of equal importance. The two features may be described as "avidity," and it is only those sera with marked avidity that are worthy of titration. Avidity and high titre are roughly

parallel. The article mentions, but does not emphasize, that the titre is influenced by the agglutinogen content of the corpuscles under test. Fallacies arise if titrations are carried out with corpuscles whose sensitivity to agglutination is unknown. All difficulties are avoided if the titration test is expanded to include a control consisting of a standard reliable serum of known titre; this will indicate whether the test corpuscles are suitable.

The authors make no mention of the simple freezing method for concentrating serum which was described by O'Meara (*J. Path. Bact.*, 1933, **37**, 166). With this procedure sera which are reasonably avid and yet have a titre below 1 in 100 can be made use of.—I am, etc.,

Army Blood Supply Depot, Bristol, Nov. 2. L. E. H. WHITBY, Colonel.

Storage and Use of Grouping Sera

SIR,—I expect others have thought of the following technique, but I have not seen it published.

The sera are stored in sterile vaccine bottles which are closed with a rubber cap. (The usual practice is to employ white glass for Group A and amber glass for Group B serum.) Each bottle is accompanied by the *shaft* of a serum needle, conveniently attached by two rubber bands; the shaft may be obtained by breaking off the shoulder, or when quantities are wanted the needle-tubing may be purchased and cut up. When a test is to be performed the needle-shaft is removed from under the rubber bands, sterilized in a flame, and allowed to cool, and the pointed end is plunged through the rubber cap for a few millimetres. The bottle is inverted, and gentle pressure is applied with the finger to the rubber cap to eject a drop of serum from the needle-shaft. This technique is equally useful whether one or a series of tests is to be performed. At the end of the sitting the needle-shaft is removed, washed through with water, and replaced under the rubber bands.

This simple procedure has a number of advantages. With ordinary care the bottles of serum remain uncontaminated for weeks or months. Packing of a complete outfit is reduced to a minimum. The manipulation required is no greater than in the case of sera sealed in glass capillaries, and it avoids the laborious process of filling and sealing dozens of capillaries. Teat pipettes are often used for delivering the sera from the bottles when many tests are to be done, but are clumsy; it is only too easy to knock over the little bottle when the pipette is in it, and there is always the risk of interchanging the A and B pipettes; the present method removes these difficulties. The wire loop used for adding the donor's blood to the grouping sera, and the needle for pricking the skin, may also be kept under the rubber bands.—I am, etc.,

Emergency Blood Supply Depot, Luton, Nov. 4. G. A. HARRISON.

Treatment of Gas Gangrene

SIR,—The leading article on chemotherapy and infections of war in your issue of October 28 (p. 859) states that all wounds which appear likely to become the site of infection with gas gangrene should receive a prophylactic course of sulphonamide compounds at the earliest opportunity.

The heavy mortality of this condition is due, in part, to a late diagnosis. E. Dunbar Newell, in a paper on gas gangrene (*Ann. Surg.*, 1939, **110**, No. 1, 100), points out the great value of roentgenograms in showing the presence of gas bubbles in the tissues. The film enables very early diagnosis to be made in suspected cases, and is positive hours before the physical sign of crepitus. As early treatment of gas gangrene can give a mortality as low as 5 to 15 per cent. instead of the usual mortality of 49 to 80 per cent., the value of this special method of early detection would seem to be worth emphasizing at the present time. Rinehart was the first to call attention to the value of the roentgenogram in making a diagnosis before the infection is clinically apparent. In suspected cases the roentgenograms should be repeated every four hours. If there is a steady increase in the number of air bubbles in each succeeding film it may be concluded that they are not due to the inclusion of air in the wound.

The presence of gas may be due to colon bacillus infection or to surgical emphysema, but clinical features of the sudden onset of violent pain in the wound, an increase of volume of the limb, a sudden rise of pulse rate in relation to the temperature, and a general appearance of grave illness should help one to the correct decision. On inspection of the wound there is oedema, a brownish discoloration round the wound, and a brownish serous discharge. The wound has often a peculiar mousy "sweet-sour," offensive, or putrid odour, and the nurses may be able to report the presence of this. It is a very characteristic odour. Many lives may be saved by the early detection of this physical sign. In the actual treatment of cases of gas gangrene one depends upon the decompression of the parts by splitting the deep fascia on two sides of the limb, the excision of dead muscle masses, hydrogen peroxide irrigations, large magnesium sulphate soaks, strict immobilization and elevation of the limb, the use of 10,000 to 30,000 units of polyvalent serum intravenously at six-hourly intervals, and the use of sulphonamide. In desperate cases amputation has to be considered.

There is still another method of treatment reported upon very favourably by Kelly and Dowell, who refer to forty-four cases of gas gangrene of the extremities treated with *x* rays (*J. Amer. med. Ass.*, 1936, **107**, 1114). There were twenty-nine in which amputation was not performed, and all these cases recovered. Out of fifteen cases who had amputations, five patients died. Kelly concludes that *x* rays seem to be definitely established as an aid in the treatment of gas gangrene.

The prevention of gas gangrene would seem to depend upon early well-executed surgery to excise the wound carefully. Dead and devitalized tissues must be removed, especially crushed muscles with damaged blood supply. Foreign bodies are removed. Thereafter the limb has to be efficiently splinted in the elevated position and the wound kept thoroughly at rest. Some surgeons now favour complete fixation in a plaster casing, as reported upon so successfully by Trueta. In the presence of severe involvement of the blood vessels of the limb and of much destruction of muscles an amputation may be the best primary treatment. There is evidence to support the view that the prophylactic injection of gas-gangrene serum is of value in lengthening the incubation period and in lessening the severity of the attack.—I am, etc.,

Edinburgh, Oct. 30. W. A. COCHRANE.

Radon Supplies

SIR,—The Radon Centre at the Middlesex Hospital has been transferred to quarters in Bedfordshire by the courtesy of the management of the Barton Lime Co., and supplies of radon will be available as from November 10. The expenses involved in the transfer of radium and plant and the equipment of the new quarters are being borne at present by the Medical Research Council and the British Empire Cancer Campaign.

The accommodation is being shared by the London Hospital, who are installing their radon plant there. Radon from 1½ grammes of radium will be available from this emergency centre. Should the demand for radon exceed the supply, it is probable that other former radon centres will join in the scheme, bringing in additional quantities of radium.

It is proposed to charge a flat rate of 1s. per millicurie, but it is recognized that for some forms of treatment radon at this rate may prove too expensive for many users. For example, the treatment of uterine cancer by the Stockholm technique would involve supplying 125 mcs. on three separate occasions. The use of 125 mcs. for twenty-two hours (first treatment) would utilize less than 20 per cent. of the radon supplied. This running to waste of 80 per cent. of the supply can to some extent be minimized by arranging that several cases are treated by means of the one supply. Certainly two and possibly three patients in series could adequately be dealt with, provided we can get collaboration to this end. If

institutions would bear this in mind when requisitioning radon a great saving can be effected and many more patients can be treated. Platinum radon seeds will be charged at cost, but ordinary platinum screens and applicators will be lent free of charge.

Communications should be addressed to the Radon Centre, c/o Barton (Beds) Lime Co., Barton-in-the-Clay, Beds.—I am, etc.,

London, W.1, Nov. 6. SIDNEY RUSS.

Treatment of Venereal Disease in the Field

SIR,—I have read with interest Lieutenant-Colonel E. T. Burke's letter in the *Journal* of November 4 (p. 928) concerning the treatment of venereal disease in the field. I agree with him that V.D. cases should preferably be treated by experienced venereologists. Mobile V.D. units would be the ideal. With modern methods of treatment there is now no need to keep the average case detached from the service unit as in the last war. The suggestion of using a preparation such as stabilarsan (already in solution) or "914" dissolved in sodium thiosulphate solution is excellent. Although I myself am always an advocate of the concurrent intermittent method of treatment for the early syphilitic, I believe that the excellent unit course suggested by Lieutenant-Colonel Burke could be simplified without loss of therapeutic effect.

May I suggest the following scheme for primary or secondary syphilis in the Services:

Unit Course

Week	Intravenous As ("914") (grammes)		Intramuscular Bismuth (grammes)
1 ..	0.45 followed four days later by 0.45	....	+ 0.24
2 ..	One injection of 0.6	.... + One injection of	0.24
3 ..	" " " 0.6	.... + " " "	0.24
4 ..	" " " 0.6	.... + " " "	0.24
5 ..	" " " 0.6	.... + " " "	0.24
6 ..	" " " 0.6	.... + " " "	0.24
7 ..	" " " 0.6	.... + " " "	0.24
8 ..	" " " 0.6	.... + " " "	0.24
9 ..	" " " 0.6	.... + " " "	0.24
10 ..	" " " 0.6	.... + " " "	0.24
	Total.. .. 6.3		+ 2.4

Each unit course to be repeated after an interval of one month, and a total of at least four courses to be given.

Serological tests should be made every three months throughout the year following the fourth course.

Finally a cerebrospinal fluid test.

I know the results of such a scheme to be a 100 per cent. cure rate; and here the patient is not subjected to five injections a week, but receives three in the first week and two in each of the following nine weeks.—I am, etc.,

C. HAMILTON WILKIE,
Nov. 6. Director of V.D. Services, Leicester Royal Infirmary.

Immunization of School Children

SIR,—One of the endless problems connected with the evacuation of children from big towns into country districts is that of the relative suspension of the school medical service. No doubt those to whom the care of the health of the child population of this country is entrusted are fully aware of the possible consequences of this situation. It is of course essential that the progress that has been achieved in social medicine should not be allowed to deteriorate even under the stress of war, but it is also essential that urgent measures which promised to come to fruition before the outbreak of hostilities should not be altogether dropped. This is particularly important when such measures have become all the more necessary owing to the present abnormal conditions. Diphtheria immunization of children is a case in point. It has been repeatedly pointed out, and Sir John Ledingham emphasizes the issue in his survey published in the *Journal* of October 28 (p. 841), that diphtheria immunization in this country is on a lamentably low level. A diphtheria epidemic among children at the present moment would threaten a heavy toll owing to the disorganization of the ordinary routine of child life and the ordinary facilities of isolation and treatment. In a letter in your columns published a fortnight before the outbreak of the war (*Supplement*, August 19, p. 153) I urged the need for a more intensive effort towards diphtheria immunization as a preparatory measure of national defence. Now that the situation that was feared has developed it is to be hoped that the responsible authorities are not losing sight of this life-saving measure. It is sincerely to be hoped that it will not be necessary for a calamity to emphasize the obvious need for this procedure.

Another problem which may become a matter of immediate urgency before long is an epidemic of measles among children bred in town and now living under conditions abnormal to them. A measles epidemic is indeed to be expected this year, and the possibility of severe respiratory complications among the evacuated children has to be considered. It is true that immune serum is not yet a perfected method for the treatment of measles, but its value is not doubted. Is it beyond the possibility of the organization of child life in the reception areas to have facilities available for the supply of such serum at short notice should the occasion arise when it has to be used?—I am, etc.,

London, E.5, Nov. 5. MAX SORSBY.

Colles's Fracture and Traumatic Oedema

SIR,—The clinical memorandum by Mr. R. Salisbury Woods in the *Journal* of October 14 (p. 767) describing a case of Colles's fracture occurring together with a dislocated elbow in the same patient once again brings before surgeons and masseuses the problem of traumatic oedema. Some years ago one used frequently to see cases of a completely stiff trophic hand following some trivial crush injury which fractured some metacarpals or phalanges. But thanks to the teaching of Böhler as regards early movement of the distal joints after a fracture such cases are fewer. Once such a condition sets in massage and stretching do more harm than good. Yet these are often carried out by masseuses who ought now to know better.

I recently dealt with a typical case of acute traumatic oedema which should never have been allowed to occur. A man sustained a simple Colles's fracture; this was correctly set and put in plaster at a hospital. During the first week he complained of tightness and swelling, but the casualty sister gave him some aspirin, and at the end of a week he was seen by a visiting surgeon. The wrist was taken out of plaster and put on a Carr's splint; massage was advised. This he had privately, and for a month the masseuse massaged and stretched the fingers and wrist. I saw him at the end of two months, when by now the fingers were practically stiff in a semi-flexed position, the wrist had no movement at all, and the circulation was poor, the skin being blue and shiny—a typical neurotrophic hand. I put the hand at rest, giving him daily wax and infra-red and contrast baths. At the end of a further fortnight the circulation was back to normal and the fingers were loosening spontaneously. Faradic arm baths and active movements such as dummy piano-playing were started. When movements were better manipulation of the wrist was carried out, after which normal recovery of the hand and wrist quickly took place. The earlier treatment indicates the abuse of massage and the failure of that masseuse to understand the physiology of the vasomotor system in fractures, and its readiness to pour out the binding traumatic oedema. This physiological problem is dealt with very lucidly by Mr. Eldon Tucker in his book on injuries.

Any patient with a Colles's fracture must be made to carry out finger exercises on the first few days after reduction of the fracture. There are, however, cases, usually in women, where the circulation appears sluggish and swelling of the fingers outside the plaster persists, even though the plaster be a split one. These cases are ones of vasomotor paralysis (see article by Turner on neurotrophic disturbances after Colles's fracture, *J. Bone Jt. Surg.*, January, 1931), and are likely to give trouble with stiffness unless special care about active movements be carried out from the first.—I am, etc.,

London, W.1, Oct. 25. G. O. TIPPETT.

Varicosities of Veins

SIR,—Mr. J. B. Oldham's letter (*Journal*, October 28, p. 885) gives facts of first-class importance about the risk of ligating the internal saphenous vein at the saphenous opening in the presumably ambulatory patient. The operation appears to be safe and is known to be very suitable for obliterating the superior reflux when the valves are incompetent, as in a Trendelenburg-positive case. Would that we could control the inferior or muscular reflux as easily. The anastomoses of the superficial epigastric, circumflex iliac, and external pudic veins are of no importance in the average case of varicosity. When they become thrombosed after an ascending injection, given by the empty-vein method with elevation of the limb, recurrence may still take place. The choice of operation now lies with the most certain surface marking. The difficulty of finding the vein lower down in its course in a fat subject is sometimes considerable.

The late Sir Henry Gray in 1909 introduced an important modification of Babcock's extraction operation and used to demonstrate that the saphenous vein could generally be felt in the wound in cases of difficulty if the limb were abducted. He also showed that the smallest knob used on his extractor when passed from above downwards would stick at the valves when Trendelenburg's sign was negative, and he then passed it from below. It occurs to me that the larger knob on the distal end would be useful to draw up the sclerosing fluid after the upper part of the vein had been tied. But is suction really necessary when any guidable solution, such as sodium salicylate, is employed? By utilizing the pain as a guide one can generally ensure that the solution enters any required areas (see *British Medical Journal* of November 9, 1929). When morrhuate or other nearly painless injection is used Mr. Oldham's method with a ureteric catheter is likely to be a permanent addition to the technique. As the pain caused by salicylate, saline, and some other solutions is a delayed one, the transit of the catheter would have to be fairly rapid or the pain would be too prolonged to be bearable.

It has been the experience of many that 30 per cent. salicylate in the absence of saphenous ligation is often insufficient to produce thrombosis, whereas 40 per cent. is enough. A condition of the vein refractory to thrombosis arises (see *Lancet* of August 8, 1931). A similar condition is figured in the *British Medical Journal* of July 13, 1935. For such types ligation of the saphena combined with injection is indicated. But one cannot as yet predict that this condition will arise. It seems to me that the obvious course will be to inject first from below upwards by the empty-vein method so as to flood the whole available area if possible and then to tie and divide the vein high up. Judging by former three-year results ligation will seldom be required. The variables are so numerous and classification so difficult that it is not yet possible to say that any one method or solution should have the preference.—I am, etc.,

London, W.1, Oct. 31. G. H. COLT.

Procaine or Percaine?

SIR,—As medical adviser to the manufacturers of percaine I attended the inquest reported in the *British Medical Journal* of October 28 under the heading "Procaine or Percaine?" The suggestion that "the most important factor was the similarity of the two names" is untenable, since the medical witness testified that (*a*) he knew that percaine and procaine were not the same drugs, (*b*) he read the words "Percaine 2 per cent. solution" on the bottle, (*c*) he referred to the manufacturers' price list in order to ascertain whether percaine 2 per cent. solution was suitable for injection, and read the words "exclusively for surface anaesthesia" in the specification of this solution.

There was, in fact, no suggestion that percaine was administered to the deceased in the mistaken belief that it was procaine. The alleged confusion between the two names (the doctor stated that he had verbally ordered procaine, while the dispenser stated that percaine had been ordered) is relevant only to the events preceding the opening of the package by the doctor. It was not the "vital distinction between the two names" that the doctor failed to appreciate, but the vital distinction between the appropriate concentrations of two substances known to be different.

The statements that "procaine . . . may be sold to a lay purchaser without restriction or record" and that the chemists were "within the law in dispensing percaine on a doctor's verbal order" if they made an entry in the prescription book are both incorrect. Procaine and percaine are both First Schedule poisons with the qualification that procaine solutions of less than 10 per cent. are exempted. A dispenser is not entitled to supply a First Schedule poison on a doctor's verbal order unless he is (*a*) satisfied that there is an emergency, and (*b*) secures an undertaking from the doctor that he will supply a written order or attend personally to sign the Poisons Book within twenty-four hours. The percaine solution was therefore improperly dispensed in this case, although it is plainly indicated in the manufacturers' price list that it is a First Schedule poison.

Accidents must be expected if poisons are dispensed and administered with a disregard of their conditions of sale and administration, and to attribute such accidents to a similarity of names when all parties concerned knew that the two names represented two different compounds is an argument which I cannot follow. It is evident from the fact that procaine, ethocaine, allocaine, syncaine, kerocaine, neocaine, novocain, and planocaine refer to an identical substance that no mere dissimilarity of terminology could serve to indicate a difference of dosage. Percaine was introduced and had become well known and widely used under that name during the three years before the official adoption of procaine—a name which was almost unknown in this country and has not yet attained general currency. A simultaneous change in the names of two well-known local anaesthetics might well have caused considerable confusion, and the manufacturers felt that it would be desirable that at least one of these drugs should retain the name under which it had become well established.—I am, etc.,

The Laboratories, Horsham, Nov. 2. N. HOWARD JONES.

*** The report might with advantage have referred to "2 per cent. procaine" instead of to "procaine" in the phrase challenged. It is, however, clear that what is referred to throughout the report is not procaine itself but a 2 per cent. solution, and it is the law that such a solution may be sold without a record having to be kept by the seller. In his principal challenge Dr. Howard Jones correctly summarizes the conditions in which—under Section 18 (2) of the Pharmacy and Poisons Act, 1933, as applied to Section 20 by Rule 7 of the Poisons Rules, 1935—poisons in the First Schedule of the Rules may be supplied to a medical practitioner. But he overlooks the alternative method provided by Section 19 of recording the supply as a prescription in the prescription book. It was to this method that the report referred and it appears to have been the method properly adopted by the chemist.—ED., *B.M.J.*

"Foreign Pharmaceutical Products"

SIR,—The schedule of pharmaceutical specialties published in your issue of October 28 was prepared as a war measure by the Association of British Chemical Manufacturers with the express object of advising the medical profession of British sources of supply for products available in replacement of preparations which were understood to be foreign products and of which supplies might prove difficult to obtain through pre-war channels. The schedule had, therefore, to be completed quickly under the stress of war conditions. The Association included in the schedule all proprietaries which it was advised were foreign products. Despite its care to have the list as accurate and complete as possible, it is regretted that a few inaccuracies have occurred, and for these the Association tenders its sincere apologies to you and to the firms concerned.

The Association is glad to be able to report that it has now been advised by the following firms—non-members of

the Association—that the products shown below against their names are in fact made in this country and should therefore be deleted from the list of foreign products:

Firm	*Product*
Ciba Ltd.	Dial tablets
Denver Chemical Manufacturing Co.	Antiphlogistine
Menley and James Ltd.	Calsoid
Modern Pharmacals Ltd.	Sulfarsenol
H. R. Napp Ltd.	Fiatal Raminal Somnosal
Gedeon Richter (Great Britain) Ltd.	Aurobin Kalmopyrin
Roche Products Ltd.	Digalen Larostidin Omnopon
William R. Warner Ltd.	Anusol Veganin.

A revised edition of the schedule is now being prepared and will be available for issue (gratis), both in replacement of the copies already distributed and for new inquirers, in the week commencing November 13. This edition will take into account the above amendments and such other omissions and additions as have already been brought to our notice. You have already been good enough to indicate a number of these in the annotation in the issue of November 4. As indicated in the foreword to the present edition, the Association will at all times welcome observations and suggestions which will enhance the accuracy and scope of the publication, and any amendments which these may necessitate will be made in subsequent editions.—I am, etc.,

166, Piccadilly, W., Nov. 6. J. DAVIDSON PRATT, General Manager, Association of British Chemical Manufacturers.

Personal Hygiene in Syllabuses of Training Colleges

SIR,—In a letter which appeared in the *Journal* of October 14 (p. 785) Dr. Octavia Lewin states: "It is well known that personal hygiene is not on the syllabus of the training colleges. It is easy to understand, therefore, why it is not in the curricula of the schools." This statement is directly contrary to the facts. Hygiene is a compulsory subject in the training colleges, and the syllabuses in use at those colleges are submitted to the Board of Education for their approval. These syllabuses, of course, include personal hygiene. Moreover, the Board's *Handbook of Suggestions on Health Education*, on which indeed some of the syllabuses are based, and which deals specially with personal hygiene, is increasingly used in the training colleges by students and lecturers alike.—I am, etc.,

Board of Education, Nov. 3. A. R. AINSWORTH.

Peter Camper

SIR,—Your interesting note on Peter Camper under "Nova et Vetera" (October 28, p. 867) would suggest that the distinguished Dutchman was primarily an exponent of "midwifery and the diseases of women," as those subjects were designated in the times in which he lived, and lived lustily, as the secrets of his diary divulge! But surely his name goes down to posterity as an anatomist at least first, and perhaps foremost. Have we not all been hard put to it to remember whether the fascia in the inguinal region which goes by his name was really the superficial or the deep sheet, both being eponymous? Garrison credits him with discovering the processus vaginalis of the peritoneum and the fibrous structure of the lens, and he certainly wrote a treatise on hernia. But in the old days the study of anatomy and the practice of obstetrics often went hand in hand, as witness the fame in both fields of James Douglas and his pouch and William Hunter and the monumental *Anatomy of the Human Gravid Uterus*.—I am, etc.,

British Postgraduate Medical School, Oct. 31. G. GREY TURNER.

Biography of Harvey Cushing

SIR,—Mrs. Cushing has requested me to prepare a biography of her husband, and I should be most grateful to anyone who wishes to make letters, anecdotes, or other memorabilia available. Copies of all letters, no matter how brief, are desired, and if dates are omitted it is hoped that, when possible, these may be supplied (for example, from the postmark). If original letters or other documents are submitted they will be copied and returned promptly.

A new medical library building is being erected at the Yale University School of Medicine to receive Dr. Cushing's library and collections, including his letters, diaries, and manuscripts. Any of his friends who wish, now or later, to present correspondence, photographs, or other memorabilia for permanent preservation among the Cushing papers will receive the appreciative thanks of the University.—I am, etc.,

JOHN F. FULTON, M.D.

Yale University School of Medicine, 333, Cedar Street, New Haven, Conn., Oct. 16.

R.M.B.F. Christmas Gifts

SIR,—Many members of the profession have most generously supported the appeal made each year for donations towards the Christmas Gift fund of the Royal Medical Benevolent Fund. In the years of peace this special work of ours in bringing extra comfort and pleasures on Christmas Day into the homes of old people directly connected with our profession has obviously appealed to the hearts and sympathy of many of your readers.

In this year of war may I through you, Sir, ask the question—Is the Fund to give its usual gift at Christmas, 1939, or are these old people to receive nothing at a time when they may be suffering from greater privations and difficulties? I am very confident that the reply will be that this is not the year to withhold the gift which means so much happiness and brings such pleasure to many old and infirm people. I invite those who can contribute to send donations to the Royal Medical Benevolent Fund, Christmas Gift Account, Wormingford, Essex. Although many members of our profession have been hard hit, yet I have every hope that the response will be a generous one.—I am, etc.,

Nov. 1. THOS. BARLOW, President.

Obituary

Dr. DAVID ALEXANDER MCCURDY, formerly of Derry, died at the Derry City and County Hospital on September 27 after an illness lasting more than thirteen years. Born in County Donegal nearly eighty-three years ago, he received his medical education at Trinity College, Dublin, and the Royal College of Surgeons in Ireland. In 1891 he qualified L.R.C.P.I. and L.M., with the special certificate in gynaecology from the Rotunda Hospital. He held for some time the post of resident surgeon to the Royal City of Dublin Hospital, and was elected F.R.C.S.I. in 1899. He had a large practice in Derry, and was the Board of Trade medical officer for that city as well as the medical representative there of the American emigration authorities. He was on board the Anchor liner *Columbia* on the historic passage when it had its bows stove in by an iceberg, but nevertheless reached its destination, New York, after three days of risk and adventure. Dr. McCurdy was widely popular in Derry, being associated with social and philanthropic activities, and highly esteemed by colleagues and patients. He joined the British Medical Association in 1892, remaining a member for thirty-five years. More than thirteen years ago he was incapacitated by a stroke, and during the last five years he had been living in Sheffield with his married daughter, returning to Derry only five weeks before his death.

Universities and Colleges

UNIVERSITY OF OXFORD

In Congregation on October 31 Sir Farquhar Buzzard, Regius Professor of Medicine, introducing two decrees, said that Professor G. R. Girdlestone, Nuffield Professor of Orthopaedic Surgery, has felt compelled to resign from his chair because of the great pressure of his clinical work. He is also resigning from the honorary clinical directorship of the Wingfield-Morris Orthopaedic Hospital because he feels that the professor should have the supervision and control of the clinical work of that hospital. Professor Girdlestone is not resigning from his appointment of honorary surgeon to the Wingfield-Morris Orthopaedic Hospital or that of honorary orthopaedic surgeon to the Radcliffe Infirmary. A decree providing for the appointment of the Nuffield Professor of Orthopaedic Surgery at £1,200 a year was approved. Hitherto it has been an honorary appointment. The new professor will not be permitted to engage in private practice for personal gain, but as clinical director of the Wingfield-Morris Hospital he will receive an additional stipend of £600 a year.

The time-table of the examinations for the degrees of B.M. and B.Ch. in the Michaelmas term, 1939, has been revised as follows: First examination, December 11, 12, 13, 15, 16, 18, and 19; second examination, December 6, 7, 8, 9, 11, 13, 14, 15, 16, and 18.

UNIVERSITY OF CAMBRIDGE

At a Congregation on November 4 the following medical degrees were conferred:

M.D.—*G. D. Hadley.

M.B., B.CHIR.—W. H. S. St. John-Brooks, H. Curtis, J. S. H. Wade, G. C. Smith.

*By proxy.

UNIVERSITY OF EDINBURGH

Sir John Donald Pollock, Bt., M.D., LL.D.Ed., Hon. D.Sc. Oxon., has been elected Rector of Edinburgh University. Sir John Pollock controls large business interests and has made many philanthropic gifts. He is a member of the executive committee of the Carnegie Trust for the Universities of Scotland and holds the honorary ranks of Colonel R.A.O.C., Surgeon Commander R.N.V.R., and Wing-Commander R.A.F.V.R. In the last New Year's Honours List a baronetcy was conferred upon him for benefactions and services to education.

QUEEN'S UNIVERSITY, BELFAST

War Service by Graduates

Queen's O.T.C. has been active in dealing with applications for commissions in the various Forces, and the Vice-Chancellor is anxious that all Queensmen and Queenswomen who have joined any branch of the Forces or the auxiliary services, or are engaged in any form of national service, should communicate with the secretary at the University to inform him of (1) the period during which they were in residence, (2) the date of their enlistment or enrolment, and (3) the branch of the Services which they have joined. The University authorities, aware of the difficulty experienced in the last war, are anxious to take steps at the present stage to secure a complete record of the war services of graduates.

The following candidates have been approved at the examination indicated:

M.B., B.CH., B.A.O.—Patricia K. Allan, T. T. Baird, A. F. Barr, P. J. Blaney, R. Calwell, R. H. Clarke, D. T. Crozier-Ritchie, A. F. Ferguson, R. F. Forbes, R. J. A. Heron, S. M. B. Hill, W. G. Jackson, C. Kelly, T. M. Kelly, W. N. M. F. Kelly, R. H. Kennedy, T. M. Lennox, J. Lillie, J. G. McAviney, J. M. McAviney, S. J. McClatchley, J. H. McIlrath, R. A. M. McVicker, D. Mitchell, T. E. Moody, C. J. K. Orr, R. Reid, A. W. W. Robinson, F. E. Scott, W. R. D. Seymour, T. B. Smiley.

CONJOINT BOARD IN SCOTLAND

The following candidates, having passed the requisite examinations, have been admitted L.R.C.P.Ed., L.R.C.S.Ed., L.R.F.P. and S.Glas.:

L. Abel, J. D. Addison, M. Ashpis, Elizabeth N. G. Baker, L. A. Bornstein, R. P. Boyd, A. Breecker, J. C. L. Cameron, C. M. Chambers, A. D. Chisholm, G. A. M. Cowie, H. Cohen, S. D. Cudioe, R. Dalrymple, I. Diamond, C. C. B. Doherty, H. Du T. Du Toit, O. Eisert, E. Emma, H. G. Ermshar, A. Fink, M. C. K. Finlayson, S. Fox, L. Gitman, A. Glassman, L. L. Goldberg, M. M. Goldenkranz, S. Gudis, G. R. Jones, A. I. Kaplan, L. A. Kaplan, E. W. Langs, R. B. Lenora, I. Levinson, M. McAlley, S. N. Mandel, M. Mariaskin, R. J. Mehr, A. Michelson, Jean Middlemiss, R. A. Morrison, J. Morton, R. S. Morton, J. H. Murray, M. N. A. Nasir, W. C. Pilgrim, E. Pravda, H. M. Pretorius, M. R. Rapoport, S. W. Rubin, T. Russell, D. R. Sandison, K. S. Seal, D. McG. Simpson, L. Singer, D. R. Skudowitz, T. M. Small, G. Smith, C. B. Storch, A. M. Tawfic, M. H. Tischler, E. M. Webster, A. Weiss.

The following graduates of recognized foreign universities were also admitted licentiates:

J. Adler, E. J. Billigheimer, J. Brand, K. F. Hirsch, E. Horowitz, R. Hurwitz, E. Schleyer, W. T. Strauss, R. Treu, A. Vogl, W. Worms.

Medical Notes in Parliament

This week the House of Commons approved a resolution to authorize the introduction of a National Loans Bill. Statements were expected from Mr. Chamberlain and Mr. Churchill on conditions of peace and the progress of the war.

The Chartered and Other Bodies (Temporary Provisions) Bill was introduced by the Lord Chancellor in the House of Lords on November 1. Its purpose is to promote economy and efficiency in the carrying on under war conditions of the work of certain chartered and other bodies, and to enable certain universities and colleges to adapt themselves to war conditions. The Bill was read a second time on November 7.

Evacuation Problems

A debate on the problems of evacuation was opened in the House of Lords on November 1 by the BISHOP OF WINCHESTER. A large number of mothers had returned to the towns, but the evacuated children were happy and were gaining in health. Very often the hosts, too, were happy, but a large number of people had been prejudiced against receiving children because some of them had left the towns with skin diseases or were infected. Such children should be sent to special hostels or camps whence, after a few days, they could, with a medical certificate, be sent on to a private house. The ARCHBISHOP OF CANTERBURY said there was urgent need for the medical officers of health throughout the country to provide special hospitals or "sick bays" in separate houses to which children who were ill or infected could be removed.

LORD DAWSON said the evacuation of children could not be more than partial, but the policy of evacuation must not be abandoned. About 250,000 children had been evacuated from London and had not returned. An equal number remained in London and were drifting about the streets. Provision must be made for the education and health of the latter, although welfare and hospital services had been reduced to skeleton services, babies were not looked after as in peace, and school medical services worked at half-speed. They could not afford to keep closed any longer the big hospitals which were the key and inspiration of medical thought. Any week now they might get the winter diseases and the height of the cycle of measles, with which they might get diphtheria. If the big hospitals were closed patients with early disease would be left at home, their condition neither diagnosed nor treated. There was danger, too, in the country districts, where an outbreak of severe influenza might occur in the overcrowded communities of the reception areas. They should remember that the power of resistance of the community was lower than in peace. He would without hesitation open the big hospitals in London, reserving one-third of each for casualties. If there were special facilities for evacuating into a hospital near by—not difficult to arrange—his proposition was quite practicable. Yet they went on from week to week and nothing happened. The big hospitals were pools of silence. The effect of removing

for any length of time the normal services from 8,000,000 people in London would inflict more suffering than the dangers envisaged from air attack. This did not imply criticism of the Emergency Medical Service, which, under its Director-General, had done wonderful work. Besides reopening the big hospitals, medical education should be restored and the training of nurses resumed. The harm which was being done to the institutions was continuous, ubiquitous, and certain. Each profession should do the work which belonged to it in the place where it should rightly be done.

Earl DE LA WARR said the evacuation scheme was prepared on the assumption that on the declaration of war London and the other great towns would be subject to heavy bombing. It was now being judged by peace standards. The Government was reopening schools in the evacuation areas because 750,000 children could not be left without education and medical care, but it appealed to parents to leave in the reception areas the children who were there.

The debate then closed.

DISCUSSION IN THE COMMONS

Evacuation was also discussed by the House of Commons on November 2. Mr. EDE opened the debate.

Dr. ELLIOT said the actual movement covered 1,400,000 persons in England and Scotland. They were: 750,000 unaccompanied children, 542,000 mothers and young children, 12,000 expectant mothers, and 77,000 others. These one and a half million people, mainly children, were entrained, moved fifty to one hundred miles, detrained, fed, and re-accommodated in the space of four days without a single casualty. Inquiries from receiving authorities and from the large cities covering nearly three-fifths of all the evacuated school children showed that, speaking broadly, about 50 per cent. of the mothers and others who were evacuated and about 78 per cent. of the unaccompanied school children were still in the reception areas. Returns of the incidence of infectious diseases in the reception areas for the first two months since the outbreak of war showed there had been no increase: indeed, the figures for the "fevers" were actually lower than for the corresponding period of 1938. It had been a sunny, healthy autumn, and these figures must be considered with due reserve.

INCIDENCE OF "FEVERS" SINCE EVACUATION

Dr. Elliot gave the following figures of the total number of cases of diphtheria, enteric fever, pneumonia, cerebro-spinal fever, and poliomyelitis in Great Britain.

Disease	Seven weeks to October 21	
	1938	1939
Diphtheria	9,960	7,637
Enteric fever	284	437
Pneumonia	4,365	3,268
Cerebrospinal fever	141	177
Poliomyelitis	544	267

For enteric fever—that is, typhoid—they got a striking result. In England and Wales there were sixty-two notifications in the week before evacuation began and seventy-seven in the week in which it actually started, as against forty-seven and thirty-two in the corresponding weeks of 1938. In the last two weeks for which we had figures they were forty-two for the evacuation year and thirty-two for last year (October 14) and thirty-one for the evacuation year as against thirty-six for last year in the last week—that ending October 21. As regards maternity cases, to move nearly 12,000 expectant mothers, still more to carry through childbirth with scratch nursing personnel and improvised accommodation, was an anxious task. In the 165 or so maternity homes, comprising 4,500 beds, which were improvised in the reception areas in Great Britain, over 3,500 confinements took place in the first six weeks of war. The proportion of complicated cases was no higher than normal. The incidence of puerperal fever and puerperal pyrexia up to the week ending October 21 showed no increase over 1938.

Circulars issued at the beginning of last month authorized the provision of accommodation in separate houses for children suffering from minor illnesses or convalescent from more serious illnesses who could not properly be cared for in their billets. Where the receiving district authority agreed, the county council would provide and maintain the sick bay. In making arrangements of this kind each case of minor illness should be admitted only on the recommendation of a medical practitioner. The practitioner should continue to attend regularly at the sick bay, and the staff should include at least one trained nurse. For an evacuated population of some 383,000, about 800 beds were being provided for non-notifiable infectious diseases and another 800 beds for minor illnesses. If the same proportion applied throughout the whole country, something like 2,500 beds had been provided for non-notifiable infectious diseases and about the same number for cases of minor illness. Measles and whooping-cough had been made compulsorily notifiable. Local authorities would know at once wherever an epidemic threatened and be able to take measures promptly.

In co-operation with the Central Medical War Committee arrangements had been made for the domiciliary treatment by general practitioners of unaccompanied school children in the reception areas. The treatment would be given to every child in need of it without charge to the householder. The practitioner would look for payment to the Government and not to the local authority. The cost worked out at slightly over 2d. a week—equivalent to about £250,000. A figure of 5,000 beds for children's illnesses and £250,000 for a children's medical service showed the scale of the scheme. The beds in the emergency hospital scheme would be available if needed to deal with calls for extra beds for cases which existing infectious diseases hospitals were not capable of accommodating.

HEALTH SERVICES IN RECEPTION AREAS

Dr. HADEN GUEST said there was urgent need in the reception areas for improved school medical and nursing services, clinics, and inspection of children. At the outbreak of war medical officers of health became heads of the casualty medical services in their districts. Public health nurses went to first-aid posts, mobile units, and other services of that kind. In many places 80 per cent. of the nurses left their ordinary public health duties. That wasted the capacities of women trained for public health duties and specially for school work. If all these nurses were withdrawn from first-aid posts and allied services they could be replaced from the civil nursing reserve. The medical and clinic services in the towns should be reopened. For these the Ministry must take some of the nurses from their present work. There were sufficient doctors to staff the public health services in the reception areas and to do the medical work required, as well as meeting the need for doctors in the casualty services. Those not required in the towns could be lent from the evacuation authorities to the reception authorities. The Minister should give a plain instruction to this effect.

Sir RALPH GLYN said he knew the immobilization of the great London hospitals and of many doctors was engaging the attention of Dr. Elliot. Doctors, who now were acquainted with their war stations, should have terms offered which enabled them to get on with their ordinary work, especially as consultants. Unless specialists were attracted to give part-time services the London hospitals could not do the work they should do. The number of beds which these hospitals were allowed would be inadequate if there happened to be an epidemic of influenza. In the last war doctors were enabled to continue their ordinary work once they had learnt their war stations. For the medical care of children evacuated to reception areas mobile clinics could go round and treat throat and ear ailments and the like.

Sir FRANCIS FREMANTLE referred to the notification of measles and whooping-cough. Notification of a disease

should imply means of dealing with it by nursing or isolation. The Ministry hoped to provide isolation in the new hutment hospitals, but in Sir Francis's part of the country it would be impossible to isolate an epidemic of whooping-cough or measles. To keep the children in reception areas safe and sound during the winter months the district nurses should be given special help. More use should be made of the county nursing associations and of the Queen's Institute of District Nursing, and arrangements should be made for the evacuating authorities to send nursing relief. Mr. HERBERT MORRISON reported difficulty with hospital supplies. The Surgical Instrument Makers' Association had agreed that 90 per cent. of their output should be allocated to the War Office for military purposes. How the voluntary and municipal hospitals would get their share out of the remaining 10 per cent. he did not know. Mr. Morrison mentioned that midwives and nurses, both for school nursing work and fever nursing, had been sent from London to the reception areas. He had an impression of lack of co-ordination within the Ministry of Health. In the Hospital Branch the officers hung on to their doctors and nurses in the casualty and base hospitals. Doctors and nurses should be allowed to go to the reception areas if their services were needed there.

Sir JOHN ANDERSON replied to the debate.

Mr. KENNETH LINDSAY announced on November 1 a decision that schools in evacuation areas which could be made available should be reopened for the education of children whose parents desired them to attend.

Reservation of Medical Students

Sir ERNEST GRAHAM-LITTLE suggested on October 26 that Mr. Ernest Brown should arrange with Mr. Hore-Belisha to reserve for military service, until after qualification, all medical students at present registered, irrespective of the stage of their studies. Mr. BROWN replied that he had consulted Dr. Elliot and was satisfied that at present the reservation of medical students who had passed the first professional examination and completed two terms of study in anatomy and physiology was adequate to meet the needs of the situation.

Petrol for Doctors

Mr. GEOFFREY LLOYD replied on November 1 to a question which asked if he knew of the difficulties experienced by doctors in some areas as regards obtaining necessary supplies of petrol, and why his Department had refused to investigate individual complaints. Mr. Lloyd said special arrangements were recently made for dealing with applications from doctors for supplementary allowances of petrol. Cases of difficulty which arose were being dealt with by the Divisional Petroleum Officers in consultation with the liaison officers appointed by the British Medical Association.

Facilities for Short-wave Therapy

Sir ERNEST GRAHAM-LITTLE asked on November 1 whether attention had been drawn to the value of short-wave therapy in the relief of pain, the healing of infected wounds, and the rapid restoration of function to maimed and injured limbs, as well as in the treatment of lung affections, especially those following gas attacks. He also asked how many of the machines required for this treatment were available in the military hospitals and what provision had been made for skilled personnel to use them. Miss HORSBRUGH replied that she knew the value of this form of treatment for the types of cases mentioned. She could not give the number of machines or of skilled personnel, but full use would be made of the plant available. This was widely distributed through the general hospitals designated for the treatment of casualties. In allocating personnel to these hospitals due provision had been made for radiological staff and radiographers.

Medical Practitioners' Enlistment

Mr. GROVES put a question on November 2 alleging dissatisfaction among members of the medical profession arising from the fact that many medical men making application for commissions in the Services had been referred to a voluntary organization of medical men to which they did not belong and to which they had no desire to make application. He asked Dr. Elliot to consider consultation with the Medical Practitioners' Union in order that its view could be presented side by side with that of the British Medical Association. Dr ELLIOT said he had no reason to believe that the medical profession in general was dissatisfied with the arrangements made by the Central Medical War Committee for the supply of doctors to the Forces. He accepted a correction from Sir Francis Fremantle that the central organization was not the British Medical Association but the Central Medical War Committee, which included others beside the British Medical Association.

Part-time Service in the Emergency Medical Service

In an answer on November 2 to Sir Ernest Graham-Little Dr. ELLIOT said that the number of specialists and senior members enrolled in the Emergency Medical Service who reported for whole-time service in the London sectors and were for the most part on the visiting staffs of the London voluntary hospitals was 656. Of these seventeen were on indefinite leave without pay and five had transferred to part-time. There had been one offer of service without obligation. The whole question had been under consideration by a special committee, including the Presidents of the three Royal Colleges. This Committee had formulated its recommendations, which it would discuss with Dr. Elliot on November 3.

Sir ERNEST GRAHAM-LITTLE said the uncertainty was mischievous for these voluntary hospitals, and only 25 per cent. of the members of these staffs had applied for part-time service. Dr. ELLIOT said it was for this reason that he would give urgent consideration to the recommendations from the special committee.

Tuberculosis in Billets

Mr. EDE inquired on November 2 whether advice had been tendered to billeting authorities on the undesirability of billeting evacuated persons, especially children, in houses in which a patient recently discharged from a tuberculosis sanatorium lived. Dr. ELLIOT answered that he had recently made it clear to a conference of representatives of the voluntary organizations for the prevention and cure of tuberculosis and of medical officers of health that patients in the infective stages of tuberculosis who had been inadvertently discharged from sanatoria at the outbreak of war should be sought out and brought back for treatment. He had no reason to believe that billeting officers were not alive to the point made by Mr. Ede. The only sound way was to seek out the tuberculous patient and give him institutional treatment. The information in the possession of local authorities as to tuberculous cases was, of course, confidential.

B.M.A.'s Protection of Practices Scheme

On November 7 Mr. GROVES asked the Minister of Health whether he was aware of and had authorized the circular letter of the Central Emergency Committee that medical practices, both as regards private and National Health Insurance practice, could be adequately protected under the British Medical Association's scheme, and in no other way. He asked whether the Minister had approved the scheme and disapproved of any other scheme whether instituted by an insurance committee or otherwise. Dr. ELLIOT replied that some of the documents issued by the Central Emergency Committee of the British Medical Association were sent to him for his information, but he did not know to what particular document Mr. Groves referred. He was aware of the Association's scheme for the protection of the practices of practitioners engaged on whole-time national service, and had recommended insurance committees to assist in its operation so far as it related to insurance practice. He had approved a number of substantially similar schemes submitted by insurance committees and panel committees jointly, and was prepared to consider any other schemes submitted by such committees.

Medical News

In reply to numerous inquiries the Clothes Room Committee of the Ladies' Guild of the Royal Medical Benevolent Fund announces that the work is being continued throughout the present national emergency. Existing conditions make every effort much more difficult, but it is hoped that the committee may have sufficient support to help all beneficiaries. Parcels of clothing can be sent as usual to B.M.A. House, Tavistock Square, W.C.1.

The Royal Society announces that the Croonian Lecture on "Aspects of Animal Locomotion" will be delivered by Professor J. Gray, F.R.S., on Thursday, November 16, at the Zoological Department, Downing Street, Cambridge. The lecture will deal primarily with the mechanism responsible for the neuromuscular co-ordination of locomotion in a variety of animals. A cinematograph demonstration will be given of each of the main facts alluded to in the lecture. Tea at 3.45 p.m.

The twenty-eighth Long Fox Memorial Lecture will be delivered by Dr. C. C. Chesterman in the H. H. Wills (large) Lecture Theatre, Bristol University (Royal Fort), on Tuesday, November 14, at 3.40 p.m. His subject is "Forest Folk: Modern Medicine in the Congo."

The first medical congress in Bolivia will be held at Caracas from December 17 to 24. A very full programme is announced.

The British Institute of Philosophy announces a series of public addresses on "The Deeper Causes of the War and the Issues Involved in it," to be given at the Royal Empire Society at 2 p.m. on Thursdays, November 16, 30, December 7, 14, and continuing after Christmas. The first four speakers will be Professor W. G. S. Adams, Professor Gilbert Murray, Viscount Samuel, and the Dean of St. Paul's. Tickets can be obtained on application to the Director of Studies, the British Institute of Philosophy, University Hall, 14, Gordon Square, London, W.C.1.

No meeting of the Medical Society of Individual Psychology will be held this month, but it is proposed to hold the December meeting in the afternoon. Notices will be sent out to members a fortnight beforehand. Publication of pamphlets will be continued.

The Maida Vale Hospital for Nervous Diseases (Maida Vale, W.), which has maintained an uninterrupted out-patient service since the outbreak of war, announces that on and after Monday, November 13, the out-patient department will be open in the mornings at 9.30. Out-patients should therefore attend at 9.30 a.m. instead of at 1.45 p.m.

The Finney-Howell Research Foundation announces that all applications for fellowships for next year must be filed in the office of the Foundation, 1211, Cathedral Street, Baltimore, Maryland, by January 1, 1940. Applications received after that date cannot be considered for 1940 awards, which will be made on March 1. This Foundation was provided for in the will of the late Dr. George Walker of Baltimore for the support of "research work into the cause or causes and the treatment of cancer." The will directed that the surplus income from the assets of the Foundation, together with the principal sum, should be expended within a period of ten years to support a number of fellowships in cancer research, each with an annual stipend of two thousand dollars, "in such universities, laboratories, and other institutions, wherever situated, as may be approved by the Board of Directors." Fellowships carrying an annual stipend of 2,000 dollars are awarded for the period of one year, with the possibility of renewal up to three years; when deemed wise by the Board of Directors, special grants of limited sums may be made to support the work carried on under a fellowship. Applications must be made on the blank forms which will be furnished by the secretary.

The notice that the hours of the out-patient department at the National Hospital for Diseases of the Nervous System (Queen Square, W.C.) have been altered has resulted in an increased number of attendances. Patients should, if possible, come on Monday, Tuesday, Wednesday, Thursday, and Friday at 9.30 a.m. In certain circumstances some patients can be seen up to 12 noon.

The French postal authorities have issued an anti-venereal postage stamp with the motto *Pour sauver la race*, the small sum spent by the purchaser over and above the ordinary value of a postage stamp being allocated to the anti-venereal diseases organization responsible to the Minister of Public Health for propaganda.

Dr. Duncan Graham of Toronto was nominated president-elect of the Canadian Medical Association at the last annual meeting at Montreal.

A campaign against undulant fever has been organized in Denmark, and has been supported by a donation of 100,000 kroner by the Government.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

The incidence of scarlet fever declined during the week in England and Wales, but diphtheria showed a slight increase; the incidence of both diseases was below the level of 1938. In Scotland and Northern Ireland notifications of both diseases were fewer, and there was an increase in Eire, slight in scarlet fever and appreciable in diphtheria. Notifications of dysentery have recently increased in Scotland, the numbers recorded in the last four weeks being 27 (6), 69 (37), 89 (60), and 39 (22). The figures in parentheses denote the notifications in Edinburgh—more than one-half of the 224 recorded for Scotland during the four-week period; the disease appears to have been mild, as there were only five deaths, representing a case mortality of 2.2 per cent.

Notification of Measles and Whooping-cough

The Minister of Health recently made regulations, which he has communicated to county councils and local authorities in England and Wales in Circulars Nos. 1896 and 1896a, whereby measles and whooping-cough must be notified by medical practitioners to medical officers of health. The object of these regulations, which were put into effect on November 1, 1939, is to provide the Ministry of Health with data on the total incidence and geographical distribution of these diseases and the bearing thereon of the displacement of susceptible subjects by evacuation schemes. Early information might enable authorities to secure supplies of immune sera or vaccines for use in the prevention or modification of these diseases in reception areas where these specific agents have not been generally available. Hitherto measles and whooping-cough have been notifiable only in certain districts and to a limited extent. For example, in the administrative county of London notification was put into effect on October 1 last year and was confined to cases occurring in a household at an interval of two months from any previous cases; other local authorities have restricted notification to subjects under 5 years of age.

Diphtheria in Europe

The decline in the morbidity and mortality of diphtheria recorded in the post-war years was followed by an increase in most European countries in the three-year period 1934–6. Since that time the disease has declined generally, but in 1938 increases compared with 1937 were encountered in Germany, England and Wales, Scotland, and Italy. There has been less diphtheria in the first six months of 1939 than in the corresponding period of 1938 in all European countries except Denmark, Finland, and Switzerland.

No. 42

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended October 21, 1939.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1939					1938 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	18	1	7	—	2	19	5	3	—	—
Deaths		—	—				—	—		
Diphtheria	975	35	189	61	31	1,367	173	233	60	20
Deaths	22	—	5	2	—	17	2	4	—	—
Dysentery	62	4	39	1	—	35	10	16	—	1
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	1	—	—		—	3	—	—		—
Deaths		—	1				1	1		
Enteric (typhoid and paratyphoid) fever	31	1	2	5	—	37	12	4	3	3
Deaths	—	—	—	1	—	1	1	—	—	—
Erysipelas			57	8	2			82	3	6
Deaths		—	—				—	1		
Infective enteritis or diarrhoea under 2 years										
Deaths	31	—	13	7	7	51	8	11	7	1
Measles			5		5		26	18		3
Deaths	1	—	—	—	—	2	—	—	—	—
Ophthalmia neonatorum	74	5	24		2	97	9	38		—
Deaths										
Pneumonia, influenzal*	493	31	5	4	11	534	45	6	5	2
Deaths (from influenza)	23	3	1	—	—	26	1	3	1	—
Pneumonia, primary			123	17				233	6	
Deaths		9		8	5		14		8	6
Polio-encephalitis, acute	3	—				7	—			
Deaths		—					—			
Poliomyelitis, acute	37	2	1	1	—	81	11	4	2	1
Deaths		—	—				2	—		
Puerperal fever	3	3	11	4	—	2	2	24	1	—
Deaths		1†					—			
Puerperal pyrexia	156	2	19		1	157	13	16		—
Deaths										
Relapsing fever	1	1			—	—	—			—
Deaths										
Scarlet fever	1,336	28	212	67	105	1,864	159	395	43	92
Deaths	2	—	—	—	1	4	—	—	1	—
Small-pox	—	—	—		—	—	—	—		—
Deaths		—	—	—	—		—	—	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough			24		5		131	163		4
Deaths	5	1	3	—	—	4	1	4	—	1
Deaths (0-1 year)	243	14	76	22	17	265	41	64	21	18
Infant mortality rate (per 1,000 live births)						44	34			
Deaths (excluding stillbirths)	4,421	650	649	176	124	4,086	764	566	154	124
Annual death rate (per 1,000 persons living)			13.1	11.8	10.9	10.0	9.7	11.5	10.4	11.0
Live births	5,583	664	851	322	219	6,663	1,266	864	305	227
Annual rate per 1,000 persons living			17.2	21.6	19.2	16.4	16.1	17.6	20.7	20.1
Stillbirths	219	20	41			255	40			
Rate per 1,000 total births (including stillborn)			46			37	31			

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.
† Death from puerperal sepsis.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the *British Medical Journal* alone, unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the *British Medical Journal* must communicate with the Secretary, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors over-seas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

ADVERTISEMENTS.—All communications should be addressed to the Advertisement Manager (office hours 9 a.m. to 5 p.m.). Orders for copies of the *Journal* and communications with reference to subscriptions should be addressed to the Secretary, B.M.A. House.

The TELEPHONE NUMBER of the British Medical Association and the *British Medical Journal* is EUSTON 2111.

The TELEGRAPHIC ADDRESSES are
EDITOR OF THE *BRITISH MEDICAL JOURNAL*, *Aitiology Westcent, London.*
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The address of the B.M.A. Scottish Office is 7, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh;* telephone 24361 Edinburgh), and of the Office of the Cumann Doctúirí na h-Éireann (I.M.A. and B.M.A.), 95, Merrion Square, W., Dublin (telephone 62550 Dublin).

QUERIES AND ANSWERS

Effect of Castor Oil on Epithelium

Dr. N. Z. KHAN (Calcutta) writes: The striking results sometimes obtained on the administration of castor oil in early and mild cases of mucoid and bloody influx of dysentery cases seems to be due to its stimulation of regenerative capacity of epithelial structures and not to the cleansing effect, as other purgatives do not help to the extent that it does. On the above assumptions is it not justified to advocate more extensive use of sterile castor oil in cases of ocular and nasopharyngeal affections, and above all in burn cases? Non-stickiness of any necessary dressing is of great significance in treating raw surfaces.

Income Tax

Staff Fund Payments

"TAU" explains that at the hospital with which he is connected that part of the Government fees which was to be paid to the honorary staff was placed to a staff fund from which payments were made for special purposes, and the balance was accumulated. "Tau" understands that income tax has been paid thereon. He is outside the scope of the hospital pension scheme, and received in 1938 a lump sum of £x as his share of the accumulations. He is being assessed to tax on that amount as if it were a profit of the year in which it was received. Is this correct?

*** If, as we understand, income tax was paid by the treasurer of the staff fund on the whole of the fees received by that fund, it seems that "Tau" has a good claim to regard the grant made to him as his share of a taxed fund, of which he and others were beneficiaries. In other words, tax has already been paid by someone acting for him, and cannot properly be charged again. If the facts do not bear that interpretation—and a full examination of the documents and circumstances is desirable—we do not consider that "Tau" can legally claim to spread the income back over the years when it accrued *to the fund*. If his legal title to participate arose only when the grant was made in 1938, then the payment was a profit of that year. Possibly some concession might be made administratively.

LETTERS, NOTES, ETC.

"Foreign Pharmaceutical Products"

Messrs. WILLIAM R. WARNER and Co., Ltd., the manufacturers of the products sold under the trade marks "Anusol" and "Veganin," explain that as a result of the inclusion of these products in the list of "Foreign Products" prepared by the Association of British Chemical Manufacturers which was reproduced in our issue of October 28 they have suffered serious reactions so far as the trade and the medical profession are concerned. As already explained, this list was published in all good faith, the Association of British Chemical Manufacturers being relied upon for its accuracy, and we regret exceedingly that any ill results should have occurred as the result of the erroneous inclusion of Messrs. William R. Warner and Co.'s products. We trust, however, that this statement and the other steps which we have taken will correct any wrong impression and reassure the trade and the medical profession that the trade marks "Anusol" and "Veganin" distinguish products which are owned by a British company and which have been manufactured in this country for many years at Messrs. Warner's factory at Chiswick, and that the continued manufacture is not in any way affected by the war.

Mr. HENRY J. W. FRANCE, Managing Director of Roche Products Limited, Welwyn Garden City, Herts, referring to the schedule of foreign pharmaceutical products with British equivalents and alternatives, writes: By omission it [the schedule] ignores all manufacturers in this country who are not members of a particular trade association. . . . I notice that no reference is made to the Roche vitamin preparations manufactured at our works here. . . . Omnopon, which we manufacture here from opium, is stated to be a foreign product.

Mr. H. C. H. GRAVES, Chairman and Managing Director of Vitamins Ltd., Hammersmith, W.6, writes in reference to the list of pharmaceutical products published in our issue of October 28, under the heading of "Foreign Pharmaceutical Products: British Equivalents and Alternatives": The effect of the omission of our name from this list is to imply either that we are a foreign firm or that our products are not worthy of inclusion in the list. . . . I would like to point out that we have had a vitamin B_1 concentrate on the market in this country long before any of the vitamin B_1 products mentioned in the list were available, and, in fact, our product was advertised in the pages of your *Journal* as long ago as May 2, 1936. Since that date we have introduced other varieties of vitamin B_1 both in the pure form—namely, as aneurin tablets and ampoules—and in the form of a natural adsorption product.

The Manager of the Saccharin Corporation Limited (London, W.) writes: I notice in your issue of October 28 a list of products which it is stated "may be difficult to obtain." Among these is novocain, and as my company is the distributor of novocain I can assure you that ample supplies are available.

Treatment of the Common Cold

Dr. N. HOWARD MUMMERY (Jersey) writes: Your columns frequently contain alleged remedies for the common cold, most of them useless or unpleasant to use, but so far I have seen no reference to a tablet with the trade name of "caapi," marketed by Messrs. H. R. Napp, Ltd., which contains atropine, caffeine, phenacetin, quinine, and cinnamon. All these ingredients are very old remedies for "colds," but in this combination they have a remarkable effect if taken strictly in accordance with the instructions on the packet, and my own experience, and that of all to whom I have recommended the remedy, is that they seldom fail to abort an acute coryza completely within twenty-four hours. I have no interest whatever in the firm mentioned.

Slippery Floors in Hospital

"TIMOCLES" writes: Some features of hospital construction seem to be nobody's business, and, apparently, the condition of floor surfaces comes into that category. Few of us who have walked the floors of hospitals have escaped occasional falls on slippery patches, and in most hospitals it is quite usual to find at least one bed occupied by some old person who, when calling to see a relative, has slipped and fractured a femur or sustained some other serious injury. These injuries must frequently come under the notice of surgeons, and it amazes me, as a physician, that no effective action is taken by them. To-day I slipped twice while walking along a tiled passage in a large hospital, but being fairly nimble I was able to maintain my equilibrium; had I been old, stout, or feeble the results might have been serious. One of the house-surgeons told me that he knew of three fractures which had occurred in this hospital during the past few months among visitors and members of the staff. (One was an ambulance man who fractured his femur.) The total number of such cases in Great Britain would probably surprise most of us. This is not a time for discussing unimportant details, but, apart from their actual danger, slippery floors must impair efficiency considerably. Surely it is time that the medical staffs insisted on the obvious remedy for this ridiculous defect which exists in so many hospitals.